



Cavanaugh Macdonald
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The experience and dedication you deserve

**Oklahoma Police
Pension and
Retirement System**

**Actuarial Valuation Report
as of July 1, 2021**





Cavanaugh Macdonald

CONSULTING, LLC

The experience and dedication you deserve

September 7, 2021

Board of Trustees

Oklahoma Police Pension and Retirement System

1001 N.W. 63rd Street, Suite 305

Oklahoma City, OK 73116-7335

Members of the Board:

At your request, we performed an actuarial valuation of the Oklahoma Police Pension and Retirement System (OPPRS) as of June 30, 2021 for the purpose of determining the required State contribution for the fiscal year ending June 30, 2022. The major findings of the valuation are contained in this report, which reflects the benefit provisions in place on June 30, 2021. There have been no changes to plan provisions, actuarial methods, or assumptions since the prior valuation.

The promised benefits of the System are included in the actuarially calculated contribution rates which are developed using the Entry Age Normal cost method. A five-year smoothed market related value of assets is used for actuarial valuation purposes. Gains and losses are reflected in the unfunded actuarial accrued liability (UAAL) that is amortized by regular annual contributions as a level dollar amount over an open 5 year period, while a surplus is amortized over 30 years .

In preparing our report, we relied, without audit, on information (some oral and some in writing) supplied by the System's staff. This information includes, but is not limited to, statutory provisions, member data and financial information. We found this information to be reasonably consistent and comparable with the information received in the prior year. The valuation results depend on the integrity of this information. If any of this information is inaccurate or incomplete, our results may be different and our calculations may need to be revised.

We further certify that all costs, liabilities, rates of interest and other factors for OPPRS have been determined on the basis of actuarial assumptions and methods which are individually reasonable (taking into account the experience of the System and reasonable expectations); and which, in combination, offer the best estimate of anticipated experience affecting OPPRS. Nevertheless, the emerging costs will vary from those presented in this report to the extent actual experience differs from that projected by the actuarial assumptions. The OPPRS Board has the final decision regarding the appropriateness of the assumptions and adopted them as indicated in Appendix B.

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In order to prepare the results in this report, we have utilized appropriate actuarial models that were developed for this purpose. These models use assumptions about future contingent events along with recognized actuarial approaches to develop the needed results. Future actuarial measurements may differ significantly from the current measurements presented in this report due to such factors as the following: plan experience differing from that anticipated by the economic or demographic assumptions; changes in economic or demographic assumptions; increases or decreases expected as part of the natural operation of the methodology used for these measurements (such as the end of an amortization period or additional cost or contribution requirements based on the plan's funded status); and changes in plan provisions or applicable law. Due to the limited scope of our assignment, we did not perform an analysis of the potential range of future measurements.

We note that as we are preparing this report, the world is in the midst of a pandemic. We have considered available information, but do not believe that there is yet sufficient data to warrant the modification of any of our assumptions. We will continue to monitor the situation and advise the Board in the future of any adjustments that we believe would be appropriate.

The actuarial computations presented in this report are for purposes of determining the funding amounts for OPPRS as set out in the Oklahoma State Statutes. The calculations in the enclosed report have been made on a basis consistent with our understanding of OPPRS' funding policy. Determinations for purposes other than meeting these requirements may be significantly different from the results contained in this report. Accordingly, additional determinations may be needed for other purposes. For example, actuarial computations for purposes of fulfilling financial accounting requirements for the System under Governmental Accounting Standard No. 67 will be presented in a separate report.

The consultants who worked on this assignment are pension actuaries with substantive experience valuing public retirement systems. Cavanaugh Macdonald's advice is not intended to be a substitute for qualified legal or accounting counsel.

On the basis of the foregoing, we hereby certify that, to the best of our knowledge and belief, this report is complete and accurate and has been prepared in accordance with assumptions and methods that meet the guidance of the Actuarial Standards of Practice. We are members of the American Academy of Actuaries and meet the Qualification Standards to render the actuarial opinion contained herein. We are available to answer any questions on the material contained in the report or to provide explanations or further details as may be appropriate.

We respectfully submit the following report and look forward to discussing it with you.

Sincerely,

A handwritten signature in blue ink, appearing to read 'Brent A. Banister', with a stylized flourish at the end.

Brent Banister, PhD, FSA, EA, FCA, MAAA
Chief Actuary

A handwritten signature in blue ink, appearing to read 'Aaron Chochon', with a stylized flourish at the end.

Aaron Chochon, ASA, EA, FCA, MAAA
Associate Actuary



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EXECUTIVE SUMMARY

OVERVIEW

The Oklahoma Police Pension and Retirement System (OPPRS) provides retirement benefits for police officers employed by any of the approximately 135 contributing entities. OPPRS is administered by its own Board of Trustees.

This report presents the results of the July 1, 2021, actuarial valuation for the System. The primary purposes of performing an actuarial valuation are to:

- Determine the employer contribution rate required to fund the System on an actuarial basis;
- Evaluate the sufficiency of the statutory contribution rate;
- Disclose asset and liability measures as of the valuation date;
- Assess and disclose the key risks associated with funding the System;
- Determine the experience of the System since the last valuation date; and
- Analyze and report on trends in System contributions, assets, and liabilities.

During the 2021 Oklahoma Legislative Session, state lawmakers passed House Bill No. 2893 which set the percent of insurance premium taxes allocated to OPPRS to 14.0% for FY 2022, 14.7% for FY 2023 through FY 2027, and 14.0% thereafter. This change essentially reverts the contributions back to prior levels after a brief holiday that was enacted in response to the COVID-19 pandemic.

The valuation results provide a snapshot view of the System's financial condition on July 1, 2021. The amount of valuation assets in excess of System liabilities increased by \$109.2 million due to various factors. A detailed analysis of the change in the unfunded actuarial accrued liability from July 1, 2020 to July 1, 2021 is shown on page 4.

The highlights of the valuation are shown below:

| \$(millions) | Actuarial Valuation Date | |
|--------------------------------------|--------------------------|--------------|
| | July 1, 2021 | July 1, 2020 |
| Actuarial Accrued Liability | \$ 2,810.2 | \$ 2,736.2 |
| Actuarial Value of Assets | \$ 2,940.1 | \$ 2,756.9 |
| Unfunded Actuarial Accrued Liability | (\$129.9) | (\$20.7) |
| Funded Ratio (Actuarial Value) | 104.6% | 100.8% |
| Market Value of Assets | \$ 3,290.0 | \$ 2,621.3 |
| Funded Ratio (Market Value) | 117.1% | 95.8% |

Note: Numbers may not add due to rounding.

There was a liability loss of about \$5.7 million, or about 0.2% of the expected actuarial accrued liability, primarily due to actual retirement experience that was less favorable than expected based on the actuarial assumptions. The estimated rate of return on the market value of assets, net of investment expenses, was 30.0% for the year ended June 30, 2021. The actuarial value of assets is determined using a method to smooth investment gains and losses in order to develop more stable contribution rates. The estimated rate of return on the actuarial value of assets was 10.5%, which resulted in an actuarial gain of about \$81.7 million. The net impact of the asset and liability experience was a gain of \$76.0 million.



EXECUTIVE SUMMARY

EXPERIENCE: July 1, 2020 to July 1, 2021

In many respects, an actuarial valuation can be thought of as an inventory process. The inventory is taken as of the actuarial valuation date, which for this valuation is July 1, 2021. On that date, the assets available for the payment of benefits are appraised. The assets are compared with the liabilities of the System, which are generally in excess of the assets. The actuarial process leads to a method of determining the contributions needed by members and employers in the future to balance the System assets and liabilities.

Changes in the System's assets and liabilities impacted the change in the actuarial contribution rate between July 1, 2020, and July 1, 2021. Each component is examined in the following discussion.

ASSETS

As of July 1, 2021, the System had total funds, when measured on a market value basis, of \$3.290 billion. This was an increase of \$668.6 million from the balance of \$2.621 billion as of July 1, 2020. The market value of assets is not used directly in the calculation of the actuarial contribution rate. An asset valuation method, which smooths the effect of market fluctuations, is used to determine the value of assets used in the valuation, called the "actuarial value of assets". Differences between the actual return on the market value of assets and the assumed return on the actuarial value of assets are phased in over a five-year period. The resulting value must be no less than 80% of the market value and no more than 120% of market value, referred to as "the corridor". See Table 3 for the detailed development of the actuarial value of assets as of July 1, 2021.

The actuarial value of assets as of July 1, 2021 was \$2.940 billion. The annualized dollar-weighted rate of return for FY 2021, measured on the actuarial value of assets, was approximately 10.5%, which resulted in an actuarial gain of \$81.7 million. Measured on the market value of assets, the estimated rate of return, net of investment expenses, was about 30.0%.

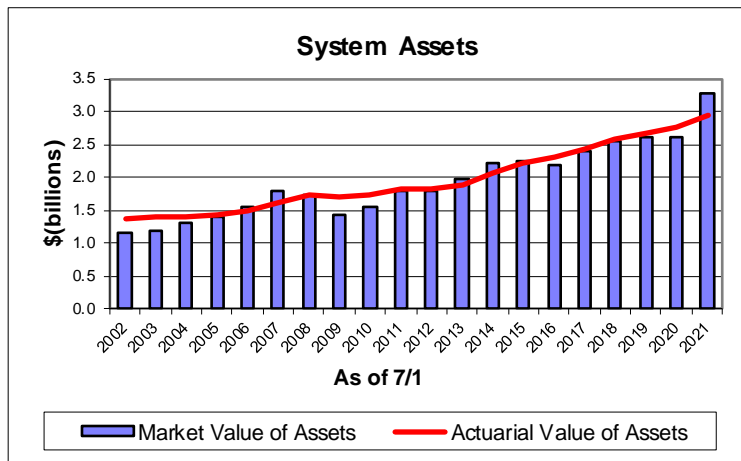
The components of the change in the market and actuarial value of assets for the System are set forth below:

| | Market Value \$(millions) | Actuarial Value \$(millions) |
|-------------------------------------|------------------------------|---------------------------------|
| Net Assets, July 1, 2020 | \$2,621 | \$2,757 |
| • Employer and Member Contributions | 101 | 101 |
| • Benefit Payments and Expenses | (202) | (202) |
| • Investment Income/(Loss) | <u>770</u> | <u>284</u> |
| Preliminary Value July 1, 2021 | \$3,290 | \$2,940 |
| Application of Corridor | N/A | N/A |
| Final Net Assets, July 1, 2021 | \$3,290 | \$2,940 |
| Estimated Rate of Return | 30.0% | 10.5% |

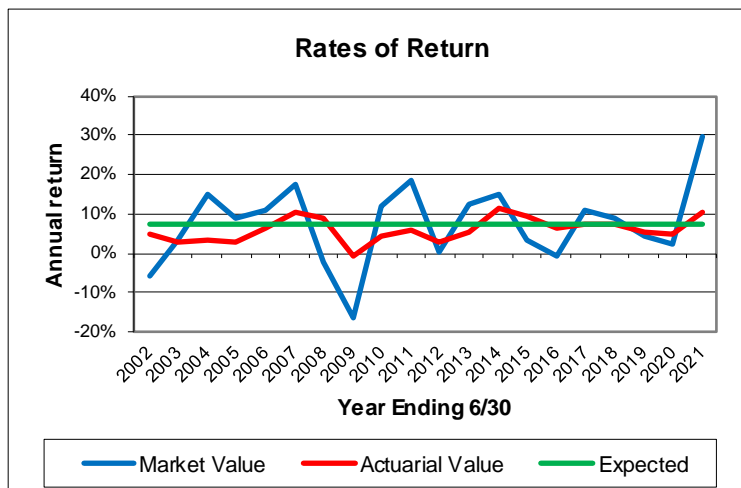
Due to the use of an asset smoothing method, there is about \$350 million of deferred investment gain that has not yet been recognized. This deferred investment experience will be reflected in the actuarial value of assets over the next four years.



EXECUTIVE SUMMARY



While the market value of assets was generally close to the actuarial value over this period due to a combination of strong returns and systematic recognition of losses, the market value of assets is now notably higher than the actuarial value due to the very favorable return during FY 2021.



Rates of return on the market value of assets are very volatile. The more stable return on the actuarial value of assets illustrates the advantage of using an asset smoothing method.

SYSTEM LIABILITIES

The actuarial accrued liability is that portion of the present value of future benefits that will not be paid by future normal costs. The difference between actuarial accrued liability and the asset value at the same date is referred to as the unfunded actuarial accrued liability (UAAL). The UAAL will be reduced if the employer's contributions exceed the employer's normal cost for the year, after allowing for interest on the previous years' unfunded actuarial accrued liability. Benefit improvements, experience gains/losses, and changes in the actuarial assumptions and methods will also impact the total actuarial accrued liability and the unfunded portion thereof.

The unfunded actuarial accrued liability as of July 1, 2021 is:

| | |
|--------------------------------------|----------------------|
| Actuarial Accrued Liability | \$2,810,243,000 |
| Actuarial Value of Assets | <u>2,940,118,000</u> |
| Unfunded Actuarial Accrued Liability | \$ (129,875,000) |

See Table 5 for the detailed development of the Actuarial Accrued Liability and Table 8 for the calculation of the Unfunded Actuarial Accrued Liability.



EXECUTIVE SUMMARY

Other factors influencing the UAAL from year to year include actual experience versus expected based on the actuarial assumptions (both asset and liability), changes in the actuarial assumptions, procedures or methods and changes in benefit provisions. The actual experience measured in this valuation is that which occurred during the plan year ending June 30, 2021. There was an experience loss on liabilities of approximately \$5.7 million and an experience gain on assets of approximately \$81.7 million. Including the State contributions in excess of the actuarial required contribution, the surplus of valuation assets above the System liabilities increased by \$109.2 million since the prior valuation.

Between July 1, 2020 and July 1, 2021 the change in the unfunded actuarial accrued liability for the System was as follows:

| | \$(millions) |
|--|---------------------|
| Unfunded Actuarial Accrued Liability, July 1, 2020 | (\$20.7) |
| · expected increase due to amortization method | 0.1 |
| · contributions above required | (29.0) |
| · investment experience | (81.7) |
| · liability experience ¹ | 5.7 |
| · other experience | (4.3) |
| Unfunded Actuarial Accrued Liability, July 1, 2021 | (\$129.9) |

¹ Liability loss is about 0.2% of total expected actuarial accrued liability

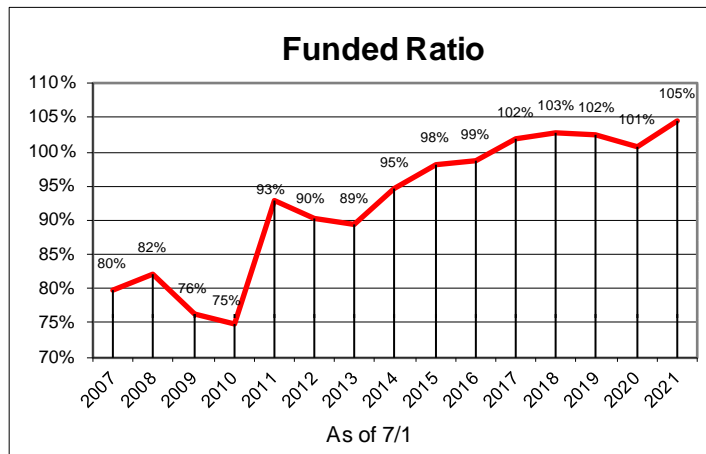
An evaluation of the unfunded actuarial accrued liability on a pure dollar basis may not provide a complete analysis because only the difference between the assets and liabilities (which are both very large numbers) is reflected. Another way to evaluate the unfunded actuarial accrued liability and the progress made in its funding is to track the funded status, which is the ratio of the actuarial value of assets to the actuarial accrued liability. The funded ratio does not indicate whether or the fund could settle all of its liabilities, nor is it sufficient by itself to indicate the future funding requirements of the plan. The funded ratio does, however, provide one indication of the funding progress made to this point in time.

The funded status information, on both an actuarial and market value basis, is shown in the following table in \$(millions).

| | 7/1/16 | 7/1/17 | 7/1/18 | 7/1/19 | 7/1/20 | 7/1/21 |
|---|---------------|---------------|---------------|---------------|---------------|---------------|
| Using Actuarial Value of Assets: | | | | | | |
| Funded Ratio | 98.7% | 101.8% | 102.8% | 102.5% | 100.8% | 104.6% |
| Unfunded Actuarial Accrued Liability (UAAL) | \$31 | (\$44) | (\$70) | (\$65) | (\$21) | (\$130) |
| Using Market Value of Assets: | | | | | | |
| Funded Ratio | 93.6% | 99.7% | 101.9% | 100.2% | 95.8% | 117.1% |
| Unfunded Actuarial Accrued Liability (UAAL) | \$150 | \$8 | (\$48) | (\$6) | \$115 | (\$480) |



EXECUTIVE SUMMARY



The funded ratio increased significantly between 2010 and 2011 due to the passage of OPLAAA, which resulted in the removal of the System's cost-of-living adjustment assumption. Since 2011, the funded ratio has gradually improved due to the strong funding practices adopted by System and the State of Oklahoma.

CONTRIBUTION RATES

The funding objective of the System is for contributions to be at least sufficient to pay the normal cost rate plus an amount that will pay off the unfunded actuarial accrued liability over a rolling five-year period.

Under the Entry Age Normal cost method, the actuarial contribution rate consists of:

- A "normal cost" for the portion of projected liabilities allocated by the actuarial cost method to service of members during the year following the valuation date;
- An "unfunded actuarial accrued liability contribution" for the excess of the portion of projected liabilities allocated to service to date over the actuarial value of assets.

Contributions to the System are made by the members and their employers. Members not in Deferred Option Plan (DOP) pay 8.00% of compensation. The employer rate is currently 13.00% of pay for actives members and 6.50% of pay for members participating in the DOP. The remainder of the Total Contribution rate is the required State contribution rate, which is a portion of the total state insurance premium tax revenue. The actuarial required contribution rate in this year's valuation includes 20.5% for normal cost plus - 3.0% for the amortization of the UAAL and 0.7% for budgeted expenses for a total of 18.2%. Currently, the total contributions are sufficient to meet the System's funding needs.

COMMENTS

As the graph on page 3 shows, investment experience continues to be extremely volatile, which creates significant challenges when funding retirement systems. The estimated rate of return on the market value of assets, net of investment expenses, for FY 2021 was about 30.0%. The market value of assets is currently greater than the actuarial value of assets, resulting in a deferred investment gain of \$350 million. This deferred gain will be recognized over the next four years, unless offset by unfavorable investment experience in future years.

We note that as we are preparing this report, the world is in the midst of a pandemic. We have considered available information, but do not believe that there is yet sufficient data to warrant the modification of any of our assumptions. We will continue to monitor the situation and advise the Board in the future of any adjustments that we believe would be appropriate.



SECTION 1 – SUMMARY OF RESULTS

For convenience of reference, the principal results of the valuation and a comparison with the preceding year's results are summarized below.

COMPARISON OF PRINCIPAL VALUATION RESULTS

| | 7/1/2021 Valuation | 7/1/2020 Valuation | % Change |
|--|-----------------------|-----------------------|-------------|
| 1. PARTICIPANT DATA | | | |
| Number of: | | | |
| Active Members - Not vested | 2,576 | 2,555 | 0.8 |
| Active Members - Vested | 2,344 | 2,435 | (3.7) |
| Active Members Total | 4,920 | 4,990 | (1.4) |
| Retired and Disabled Members and Beneficiaries | 4,082 | 3,912 | 4.3 |
| Deferred Option Plan (DOP) Members | 1 | 2 | (50.0) |
| Inactive Members | 1,159 | 1,060 | 9.3 |
| Total members | 10,162 | 9,964 | 2.0 |
| Projected Annual Salaries of Active Members | \$ 350,565,103 | \$ 351,343,791 | (0.2) |
| Annual Retirement Payments for Retired Members, Disabled Members, and Beneficiaries | \$ 138,337,077 | \$ 129,851,595 | 6.5 |
| 2. ASSETS AND LIABILITIES | | | |
| Total Actuarial Accrued Liability | \$ 2,810,243,000 | \$ 2,736,156,000 | 2.7 |
| Market Value of Assets | \$ 3,289,959,000 | \$ 2,621,311,000 | 25.5 |
| Actuarial Value of Assets | \$ 2,940,118,000 | \$ 2,756,877,000 | 6.6 |
| Unfunded Actuarial Accrued Liability | \$ (129,875,000) | \$ (20,721,000) | 526.8 |
| Funded Ratio (Actuarial Assets) | 104.6% | 100.8% | 3.8 |
| 3. EMPLOYER CONTRIBUTION RATES AS A PERCENT OF PAYROLL | | | |
| Normal Cost Rate | 20.5% | 20.5% | 0.0 |
| Amortization of Unfunded Actuarial Accrued Liability | (3.0%) | (0.5%) | 500.0 |
| Budgeted Expenses | 0.7% | 0.7% | 0.0 |
| Total Actuarial Required Contribution Rate | 18.2% | 20.7% | (12.1) |
| Less Member Contribution Rate | (8.0%) | (8.0%) | 0.0 |
| Less Estimated Employer Contribution Rate | (13.0%) | (13.0%) | 0.0 |
| Required State Contribution Rate | 0.0% | 0.0% | 0.0 |
| Required State Contribution Amount | \$ 0 | \$ 0 | 0.0 |



Oklahoma Police Pension and Retirement System

Market Value of Assets

The current market value represents the "snapshot" or "cash-out" value of System assets as of the valuation date. In addition, market values of assets provide a basis for measuring investment performance from time to time. As of July 1, 2021, the market value of assets for the System was \$3.290 billion. Table 1 is a comparison, at market values, of System assets as of June 30, 2021 and June 30, 2020 in total and by investment category. Table 2 summarizes the change in the market value of assets from July 1, 2020 to June 30, 2021.

Actuarial Value of Assets

Neither the market value of assets, representing a "cash-out" value of System assets, nor the book value of assets, representing the cost of investments, may be the best measure of the System's ongoing ability to meet its obligations.

To arrive at a suitable value for the actuarial valuation, a technique for determining the actuarial value of assets is used, which dampens swings in the market value while still indirectly recognizing market values.

The actuarial value of assets is based on a five-year moving average of expected and actual market values determined as follows:

- the expected market asset value is calculated as the sum of the previous year's market value increased with a year's interest at the System's valuation rate plus net cash flow adjusted for interest (at the same rate) to the end of the previous fiscal year;
- the difference between the expected market value and the actual market value is the investment gain or loss for the previous fiscal year;
- each year, 20% of the initial gain or loss for the past five fiscal years is recognized;
- the actuarial asset value is the market value less the unrecognized investment gains and losses for each of the five previous fiscal years, but neither more than 120% of the market value nor less than 80% of the market value.

Table 3 shows the development of the actuarial value of assets (AVA) as of the valuation date.



Oklahoma Police Pension and Retirement System

Table 1

Analysis of Net Assets at Market Value

| | June 30, 2021 | | June 30, 2020 | |
|-------------------------------|------------------------|---------------|------------------------|---------------|
| | Amount \$(millions) | % of Total | Amount \$(millions) | % of Total |
| Cash & Short-term Investments | \$ 62.8 | 1.9% | \$ 37.6 | 1.4% |
| Receivables | 11.7 | 0.3% | 15.5 | 0.6% |
| U.S. Government Bonds | 42.2 | 1.2% | 37.9 | 1.4% |
| Corporate Bonds | 495.2 | 14.7% | 436.8 | 16.2% |
| Domestic Stock | 921.7 | 27.2% | 659.4 | 24.5% |
| International Stock | 536.6 | 15.8% | 399.7 | 14.8% |
| Private Equity | 472.9 | 14.0% | 295.9 | 11.0% |
| Hedge Funds | 361.0 | 10.7% | 394.6 | 14.6% |
| Real Estate | 392.4 | 11.6% | 324.6 | 12.0% |
| Commodities | 0.0 | 0.0% | 22.8 | 0.9% |
| Securities Lending Collateral | 89.0 | 2.6% | 70.7 | 2.6% |
| Subtotal | \$ 3,385.5 | 100.0% | \$ 2,695.5 | 100.0% |
| Net Receivables/(Payables) | (95.5) | | (74.2) | |
| Net Assets | \$ 3,290.0 | | \$ 2,621.3 | |



Oklahoma Police Pension and Retirement System

Table 2

Statement of Changes in Net Assets

| | Fiscal Year Ended June 30 | |
|---|---------------------------|------------------|
| | 2021 | 2020 |
| 1. Market Value of Net Assets at Beginning of Year | \$ 2,621,311,000 | \$ 2,618,857,000 |
| 2. Contributions | | |
| a. Members | \$ 27,946,000 | \$ 27,310,000 |
| b. Participating employers | 44,405,000 | 44,226,000 |
| c. Insurance premium tax | 28,368,000 | 40,295,000 |
| d. Total contributions | \$ 100,719,000 | \$ 111,831,000 |
| 3. Net Investment Income | | |
| a. Interest and dividends | \$ 21,549,000 | \$ 18,050,000 |
| b. Realized gain and unrealized appreciation | 766,078,000 | 54,283,000 |
| c. Other | 373,000 | 622,000 |
| d. Total | 788,000,000 | 72,955,000 |
| e. Investment expenses | (17,869,000) | (17,147,000) |
| f. Net investment income | \$ 770,131,000 | \$ 55,808,000 |
| 4. Total additions/(subtractions) (2d) + (3f) | \$ 870,850,000 | \$ 167,639,000 |
| 5. Deductions | | |
| a. Retirement benefits | \$ 198,409,000 | \$ 160,742,000 |
| b. Refunds of contributions | 1,813,000 | 2,451,000 |
| c. Administrative expenses | 1,980,000 | 1,992,000 |
| d. Total deductions | \$ 202,202,000 | \$ 165,185,000 |
| 6. Net Change in Assets (4) - (5d) | 668,648,000 | 2,454,000 |
| 7. Market Value of Net Assets at End of Year (1) + (6) | \$ 3,289,959,000 | \$ 2,621,311,000 |



SECTION 2 - ASSETS

Oklahoma Police Pension and Retirement System

Table 3

Determination of Actuarial Value of Assets

| | | |
|---|----|---------------|
| 1. Market Value as of July 1, 2020 | \$ | 2,621,311,000 |
| 2. Contributions | \$ | 100,719,000 |
| 3. Decreases during year | | |
| a. Retirement benefits | \$ | (198,409,000) |
| b. Refunds of contributions | | (1,813,000) |
| c. Administrative expenses | | (1,980,000) |
| d. Total deductions | \$ | (202,202,000) |
| 4. Expected return on assets at 7.5% | \$ | 192,862,000 |
| 5. Expected Market Value as of June 30, 2021 (1) + (2) + (3d) + (4) | \$ | 2,712,690,000 |
| 6. Actual Market Value as of June 30, 2021 | \$ | 3,289,959,000 |
| 7. Year end 2021 asset gain/(loss) (6) - (5) | \$ | 577,269,000 |

Schedule of Asset Gains/(Losses)

| Year End | Original Amount | Recognized in Prior Years | Recognized in This Year | Recognized in Future Years |
|--|-----------------|------------------------------|----------------------------|-------------------------------|
| 2017 | \$ 79,083,000 | \$ 63,268,000 | \$ 15,815,000 | \$ 0 |
| 2018 | 27,162,000 | 16,296,000 | 5,432,000 | 5,434,000 |
| 2019 | (85,555,000) | (34,222,000) | (17,111,000) | (34,222,000) |
| 2020 | (138,642,000) | (27,728,000) | (27,728,000) | (83,186,000) |
| 2021 | 577,269,000 | 0 | 115,454,000 | 461,815,000 |
| Total | | \$ | 91,862,000 | \$ 349,841,000 |
| 8. Asset gain/(loss) to be recognized in the future | | | \$ | 349,841,000 |
| 9. Initial Actuarial Value as of June 30, 2021 (6) - (8) | | | \$ | 2,940,118,000 |
| 10. Constraining values: | | | | |
| a. 80% of market value (6) x 0.8 | | | \$ | 2,631,967,000 |
| b. 120% of market value (6) x 1.2 | | | \$ | 3,947,951,000 |
| 11. Actuarial Value as of June 30, 2021 (9), but not less than (10a), nor greater than (10b), rounded | | | \$ | 2,940,118,000 |



Oklahoma Police Pension and Retirement System

In the previous section, an actuarial valuation was compared with an inventory process, and an analysis was given of the inventory of assets of the System as of the valuation date, July 1, 2021. In this section, the discussion will focus on the commitments of the System, which are referred to as its liabilities.

Table 4 contains the actuarial present value of all future benefits (PVFB) for contributing members, inactive members, retirees and their beneficiaries.

The liabilities summarized in Table 4 include the actuarial present value of all future benefits expected to be paid with respect to each member. For an active member, this value includes measures of both benefits already earned and future benefits expected to be earned. For all members, active and retired, the value includes benefits earnable and payable for the rest of their lives and, if an optional benefit is chosen, for the lives of the surviving beneficiaries.

The actuarial assumptions used to determine liabilities are shown in Appendix B. The liabilities reflect the benefit structure in place as of July 1, 2021.

Actuarial Accrued Liabilities

A fundamental principle in financing the liabilities of a retirement program is that the cost of its benefits should be related to the period in which benefits are earned, rather than to the period of benefit distribution. An actuarial cost method is a mathematical technique that allocates the present value of future benefits into annual costs. In order to do this allocation, it is necessary for the funding method to “break down” the present value of future benefits into two components:

- (1) that which is attributable to the past; and
- (2) that which is attributable to the future.

Actuarial terminology calls the part attributable to the past the “past service liability” or the “actuarial accrued liability”. The portion allocated to the future is known as the “present value of future normal costs”, with the specific piece of it allocated to the current year being called the “normal cost”. Table 5 contains the calculation of actuarial accrued liabilities for all groups.



Oklahoma Police Pension and Retirement System

Table 4

**Present Value of Future Benefits
As of July 1, 2021**

| | <u>Total</u> |
|--|----------------------|
| 1. Active Employees | |
| a. Retirement Benefit | \$ 1,885,892,000 |
| b. Withdrawal Benefit | 54,780,000 |
| c. Pre-Retirement Death Benefit | 24,423,000 |
| d. Disability Benefit | <u>6,541,000</u> |
| e. Subtotal | \$ 1,971,636,000 |
| 2. Inactive Nonvested Members | \$ 4,473,000 |
| 3. Inactive Vested Members | \$ 24,737,000 |
| 4. Disabled Members | \$ 25,217,000 |
| 5. Retirees | \$ 1,238,403,000 |
| 6. Beneficiaries | \$ 195,024,000 |
| 7. DOP Members, Including DOP Balances | \$ <u>2,451,000</u> |
| 8. Total PVFB | \$ 3,461,941,000 |
| Inactive Members Eligible for Automatic COLA | \$ 84,971,000 |
| Inactive Members Not Eligible for Automatic COLA | <u>1,405,334,000</u> |
| Total Inactive Liability | \$ 1,490,305,000 |

**Oklahoma Police Pension and Retirement System****Table 5****Actuarial Accrued Liability
As of July 1, 2021**

| | <u>Total</u> |
|--|----------------------|
| 1. Present Value of Future Benefits for Active Members | |
| a. Retirement Benefit | \$ 1,885,892,000 |
| b. Withdrawal Benefit | 54,780,000 |
| c. Pre-Retirement Death Benefit | 24,423,000 |
| d. Disability Benefit | <u>6,541,000</u> |
| e. Subtotal | \$ 1,971,636,000 |
| 2. Present Value of Future Normal Costs for Active Members | |
| a. Retirement Benefit | \$ 565,848,000 |
| b. Withdrawal Benefit | 63,213,000 |
| c. Pre-Retirement Death Benefit | 15,417,000 |
| d. Disability Benefit | <u>7,220,000</u> |
| e. Subtotal | \$ 651,698,000 |
| 3. Present Value of Future Benefits for Inactive Members | <u>1,490,305,000</u> |
| 4. Total Actuarial Accrued Liability (1e) - (2e) + (3) | \$ 2,810,243,000 |



Oklahoma Police Pension and Retirement System

Table 6

Calculation of Actuarial Gain/(Loss)

| | |
|---|--------------------|
| 1. Expected actuarial accrued liability | |
| a. Actuarial accrued liability at July 1, 2020 | \$ 2,736,156,000 |
| b. Normal cost for FY 2021 | 65,807,000 |
| c. Benefit payments for fiscal year ending June 30, 2021 | (200,222,000) |
| d. Interest on (a), (b), and (c) | <u>202,775,000</u> |
| e. Expected actuarial accrued liability as of July 1, 2021 | \$ 2,804,516,000 |
| 2. Actuarial accrued liability at July 1, 2021 | \$ 2,810,243,000 |
| 3. Actuarial accrued liability gain/(loss) (1e) - (2) | \$ (5,727,000) |
| 4. Expected actuarial value of assets | |
| a. Actuarial value of assets at July 1, 2020 | \$ 2,756,877,000 |
| b. Contributions for fiscal year ending June 30, 2021 | 100,719,000 |
| c. Benefit payments and expenses for fiscal year ending June 30, 2021 | (202,202,000) |
| d. Interest on (a), (b), and (c) | <u>203,029,000</u> |
| e. Expected actuarial value of assets as of July 1, 2021 | \$ 2,858,423,000 |
| 5. Actuarial value of assets at July 1, 2021 | \$ 2,940,118,000 |
| 6. Actuarial value of assets gain/(loss) (5) - (4e) | \$ 81,695,000 |
| 7. Net actuarial gain/(loss) (3) + (6) | \$ 75,968,000 |



Oklahoma Police Pension and Retirement System

In the previous two sections, attention has been focused on the assets and the liabilities (present value of future benefits) of the System. A comparison of Tables 3 and 4 indicates that there is a shortfall in current actuarial assets needed to meet the present value of all future benefits for current members and beneficiaries.

In an active system, it is typical for there to be a shortfall between the assets and the present value of all future benefits. An actuarial valuation determines a schedule of future contributions that will provide for this funding in an orderly fashion.

The method used to determine the incidence of the contributions in various years is called the actuarial cost method. Under an actuarial cost method, the contributions required to meet the difference between current assets and current liabilities are allocated each year between two elements: (1) the normal cost and (2) the payment on the unfunded actuarial accrued liability.

The term “fully funded” is often applied to a system in which contributions at the normal cost rate are sufficient to pay for the benefits of existing employees as well as for those of new employees. More often than not, systems are not fully funded, either because of past benefit improvements that have not been completely funded and/or because of actuarial deficiencies that have occurred because experience has not been as favorable as anticipated under the actuarial assumptions. Under these circumstances, an unfunded actuarial accrued liability (UAAL) exists. However, as of the July 1, 2021 valuation, the Oklahoma Police Pension and Retirement System has a negative UAAL. This is an indication that the funding of benefits is proceeding ahead of schedule.

Description of Rate Components

The actuarial cost method used by the System is the traditional Entry Age Normal (EAN) – level-percent of pay cost method. Under the EAN cost method, the actuarial present value of each member’s projected benefit is allocated on a level basis over the member’s compensation between the entry age of the member and the assumed exit ages. The portion of the actuarial present value allocated to the valuation year is called the normal cost. The actuarial present value of benefits allocated to prior years of service is called the actuarial accrued liability. The unfunded actuarial accrued liability represents the difference between the actuarial accrued liability and the actuarial value of assets as of the valuation date. The unfunded actuarial accrued liability is calculated each year and reflects experience gains/losses. The UAAL is amortized as a level-dollar amount over an open 5-year period, while a surplus is amortized over 30 years.

Contribution Rate Summary

The normal cost rate is developed in Table 7. Table 8 develops the contribution rate for amortization of the unfunded actuarial accrued liability. Table 9 develops the total actuarial contribution rate.



SECTION 4 – EMPLOYER CONTRIBUTIONS

Oklahoma Police Pension and Retirement System

Table 7

Normal Cost Contribution Rates As Percentages of Salary

| | Total | % of Pay |
|--|----------------|----------|
| 1. Normal Cost | | |
| a. Retirement Benefit | \$ 57,303,000 | 17.80% |
| b. Withdrawal Benefit | 6,362,000 | 1.98% |
| c. Pre-Retirement Death Benefit | 1,573,000 | 0.49% |
| d. Disability Benefit | 716,000 | 0.22% |
| e. Total | \$ 65,954,000 | 20.49% |
| 2. Estimated Payroll for Current Actives | \$ 321,839,000 | |
| 3. Normal Cost Rate (1e)/(2) | 20.49% | |



SECTION 4 – EMPLOYER CONTRIBUTIONS

Oklahoma Police Pension and Retirement System

Table 8

Unfunded Actuarial Accrued Liability Contribution Rate

| | |
|---|----------------------|
| 1. Actuarial Present Value of Future Benefits | \$ 3,461,941,000 |
| 2. Actuarial Present Value of Future Normal Costs | <u>651,698,000</u> |
| 3. Actuarial Accrued Liability (1) - (2) | \$ 2,810,243,000 |
| 4. Actuarial Value of Assets | <u>2,940,118,000</u> |
| 5. Unfunded Actuarial Accrued Liability (UAAL) (3) - (4) | \$ (129,875,000) |
| 6. Amortization of UAAL over 30 years (mid-year)* | \$ (10,606,000) |
| 7. Total Estimated Payroll for Year Ending June 30, 2022 | \$ 350,669,000 |
| 8. Amortization as a Percent of Payroll | (3.0%) |

*The UAAL is amortized as a level-dollar amount.



SECTION 4 – EMPLOYER CONTRIBUTIONS

Oklahoma Police Pension Retirement System

Table 9

Actuarial Contribution Rate

| | Valuation as of July 1, | | | |
|---|-------------------------|-------------|--------------|-------------|
| | 2021 | | 2020 | |
| | Amount | Rate of Pay | Amount | Rate of Pay |
| 1. Total Normal Cost* | \$72,041,000 | 20.5% | \$72,172,000 | 20.5% |
| 2. Amortization of UAAL | (10,606,000) | (3.0%) | (1,692,000) | (0.5%) |
| 3. Budgeted Expenses | 2,387,000 | 0.7% | 2,310,000 | 0.7% |
| 4. Total Required Contribution | \$63,822,000 | 18.2% | \$72,790,000 | 20.7% |
| 5. Member Contributions | 28,045,000 | 8.0% | 28,108,000 | 8.0% |
| 6. Estimated Employer Contributions** | 45,580,000 | 13.0% | 45,694,000 | 13.0% |
| 7. Required State Contribution (4) - (5) - (6) (not less than \$0) | \$0 | 0.0% | \$0 | 0.0% |
| 8. Prior year actual state contributions Rate is percentage of prior year compensation | \$28,368,000 | 8.1% | \$40,295,000 | 11.9% |

* Normal cost is typically determined as a rate of pay. Dollar amount shown is an estimate only.

**Determination of Employer Rate

| | | |
|----------------------------------|-------------|-------------|
| Active member projected payroll | 350,565,103 | 351,343,791 |
| Employer contribution rate | 13.0% | 13.0% |
| Estimated employer contributions | 45,573,463 | 45,674,693 |
| DOP member payroll | 103,398 | 299,989 |
| Employer contribution rate | 6.5% | 6.5% |
| Estimated employer contributions | 6,721 | 19,499 |
| Total contributions | 45,580,184 | 45,694,192 |
| As a percentage of total pay | 13.0% | 13.0% |

Note: Due to rounding, there may be differences in addition or multiplication.



Oklahoma Police Pension and Retirement System

Actuarial Standards of Practice are issued by the Actuarial Standards Board and are binding on credentialed actuaries practicing in the United States. These standards generally identify what the actuary should consider, document and disclose when performing an actuarial assignment. In September, 2017, Actuarial Standard of Practice Number 51, *Assessment and Disclosure of Risk in Measuring Pension Obligations*, (ASOP 51) was issued as final with application to measurement dates on or after November 1, 2018. This ASOP, which applies to funding valuations, actuarial projections, and actuarial cost studies of proposed plan changes, was first applicable for the July 1, 2019 actuarial valuation for the Oklahoma Police Pension and Retirement System (System).

A typical retirement plan faces many different risks, but the greatest risk is the inability to make benefit payments when due. If plan assets are depleted, benefits may not be paid which could create legal and litigation risk or the plan could become “pay as you go”. The term “risk” is most commonly associated with an outcome with undesirable results. However, in the actuarial world, risk can be translated as uncertainty. The actuarial valuation process uses many actuarial assumptions to project how future contributions and investment returns will meet the cash flow needs for future benefit payments. Of course, we know that actual experience will not unfold exactly as anticipated by the assumptions and that uncertainty, whether favorable or unfavorable, creates risk. ASOP 51 defines risk as the potential of actual future measurements to deviate from expected results due to actual experience that is different than the actuarial assumptions.

The various risk factors for a given plan can have a significant impact – positive or negative – on the actuarial projection of liability and contribution rates.

There are a number of risks inherent in the funding of a defined benefit plan. These include:

- economic risks, such as investment return and price inflation;
- demographic risks such as mortality, payroll growth, aging population including impact of baby boomers, and retirement ages;
- contribution risk, i.e., the potential for contribution rates to be too high for the plan sponsor/employer to pay and
- external risks such as the regulatory and political environment.

There is a direct correlation between healthy, well-funded retirement plans and consistent contributions equal to the full actuarial contribution rate each year. The sources of funding for OPPRS do not guarantee that the full contributions will be made, but because the System is currently well-funded, the amounts are currently sufficient. There is a risk if the funded status declines significantly that the contribution structure would not be able to return the System to being well-funded.

Another significant risk factor for OPPRS is investment return because of the volatility of returns and the size of plan assets compared to payroll (see Table 10). A perusal of historical returns over 10-20 years reveals that the actual return each year is rarely close to the average return for the same period. This is to be expected, given the underlying capital market assumptions and the System’s asset allocation.

A key demographic risk for all retirement systems, including OPPRS, is improvements in mortality (longevity) greater than anticipated. While the actuarial assumptions reflect small, continuous improvements in mortality experience over time and these assumptions are refined every experience study, the risk arises because there is a possibility of some sudden shift, perhaps from a significant medical



SECTION 5 – RISK CONSIDERATIONS

breakthrough, that could quickly increase liabilities. Likewise, there is some possibility of a public health crisis that could result in a significant number of additional deaths in a short time period, as experienced with the COVID-19 pandemic. This type of event is also significant, although more easily absorbed. While either of these events could happen, it represents a small probability and thus represents much less risk than the volatility associated with investment returns.

The following exhibits summarize some historical information that helps indicate how certain key risk metrics have changed over time. Many are due to the maturing of the retirement system.

**Oklahoma Police Pension and Retirement System****Table 10****Historical Asset Volatility Ratios**

As a retirement system matures, the size of the market value of assets increases relative to the covered payroll of active members, on which the System is funded. The size of the plan assets relative to covered payroll, sometimes referred to as the asset volatility ratio, is an important indicator of the contribution risk for the System. The higher this ratio, the more sensitive a plan's contribution rate is to investment return volatility. In other words, it will be harder to recover from investment losses with increased contributions.

| Actuarial Valuation Date | Market Value of Assets | Estimated Plan Year Payroll | Asset Volatility Ratio | Increase in ACR with a Return 10% Lower than Assumed* |
|---|-----------------------------------|--|---------------------------------------|--|
| 6/30/2002 | \$1,156,636,000 | \$179,742,853 | 6.43 | 15.33% |
| 6/30/2003 | 1,182,326,000 | 190,707,025 | 6.20 | 14.78% |
| 6/30/2004 | 1,319,329,000 | 194,528,516 | 6.78 | 16.16% |
| 6/30/2005 | 1,414,945,000 | 206,525,374 | 6.85 | 16.33% |
| 6/30/2006 | 1,549,723,000 | 217,558,055 | 7.12 | 16.97% |
| 6/30/2007 | 1,797,555,000 | 231,257,280 | 7.77 | 18.52% |
| 6/30/2008 | 1,734,149,000 | 246,191,165 | 7.04 | 16.78% |
| 6/30/2009 | 1,431,305,000 | 258,477,576 | 5.54 | 13.21% |
| 6/30/2010 | 1,558,741,000 | 253,259,725 | 6.15 | 14.66% |
| 6/30/2011 | 1,811,460,000 | 257,504,567 | 7.03 | 16.76% |
| 6/30/2012 | 1,784,760,000 | 266,038,359 | 6.71 | 16.00% |
| 6/30/2013 | 1,976,839,000 | 279,013,522 | 7.09 | 16.90% |
| 6/30/2014 | 2,238,466,000 | 289,502,327 | 7.73 | 18.43% |
| 6/30/2015 | 2,264,996,000 | 295,307,065 | 7.67 | 18.28% |
| 6/30/2016 | 2,201,671,000 | 314,557,000 | 7.00 | 16.69% |
| 6/30/2017 | 2,395,381,000 | 314,374,000 | 7.62 | 18.17% |
| 6/30/2018 | 2,563,446,000 | 324,190,000 | 7.91 | 18.86% |
| 6/30/2019 | 2,618,857,000 | 339,854,000 | 7.71 | 18.38% |
| 6/30/2020 | 2,621,311,000 | 351,644,000 | 7.45 | 17.76% |
| 6/30/2021 | 3,289,959,000 | 350,669,000 | 9.38 | 22.36% |

Note: Years prior to the 6/30/2016 were provided by the prior actuary.

* The impact of asset smoothing is not reflected in the impact on the Actuarial Contribution Rate (ACR). The increase in the ACR is based on the 5-year amortization that would apply if the System funded ratio was below 100%. Current year assumptions are used for all years shown.

The assets at June 30, 2021 are 938% of payroll, so underperforming the investment return assumption by 10.00% (i.e., earn -2.50% for one year) is equivalent to 93.8% of payroll. While the actual impact in the first year is mitigated by the asset smoothing method and amortization of the UAAL, this illustrates the risk associated with volatile investment returns. Such an event in one year would be expected to increase the actuarial contribution rate by 22.36% of payroll once it is fully recognized in the asset smoothing method.



Oklahoma Police Pension and Retirement System

Table 11

Historical Cash Flows

Plans with negative cash flows will experience increased sensitivity to investment return volatility. Cash flows, for this purpose, are measured as contributions less benefit payments. If the System has negative cash flows and then experiences returns below the assumed rate, there are fewer assets to be reinvested to earn the higher returns that typically follow. While any negative cash flow will produce such a result, it is typically a negative cash flow of more than 5% of MVA that may cause significant concerns. OPPRS has had negative cash flows of around 2% for many years, and there is no concern for the foreseeable future.

| Year End | Market Value of Assets (MVA) | Contributions | Benefit Payments | Net Cash Flow | Net Cash Flow as a Percent of MVA |
|-----------|------------------------------------|---------------|---------------------|------------------|---|
| 6/30/2002 | \$1,156,636,000 | \$54,589,000 | \$67,857,000 | (\$13,268,000) | (1.15%) |
| 6/30/2003 | 1,182,326,000 | 57,017,000 | 71,325,000 | (14,308,000) | (1.21%) |
| 6/30/2004 | 1,319,329,000 | 37,327,000 | 75,286,000 | (37,959,000) | (2.88%) |
| 6/30/2005 | 1,414,945,000 | 62,965,000 | 81,313,000 | (18,348,000) | (1.30%) |
| 6/30/2006 | 1,549,723,000 | 65,400,000 | 85,213,000 | (19,813,000) | (1.28%) |
| 6/30/2007 | 1,797,555,000 | 73,098,000 | 92,426,000 | (19,328,000) | (1.08%) |
| 6/30/2008 | 1,734,149,000 | 74,078,000 | 94,097,000 | (20,019,000) | (1.15%) |
| 6/30/2009 | 1,431,305,000 | 77,727,000 | 97,052,000 | (19,325,000) | (1.35%) |
| 6/30/2010 | 1,558,741,000 | 74,158,000 | 111,440,000 | (37,282,000) | (2.39%) |
| 6/30/2011 | 1,811,460,000 | 75,980,000 | 105,566,000 | (29,586,000) | (1.63%) |
| 6/30/2012 | 1,784,760,000 | 81,101,000 | 116,175,000 | (35,074,000) | (1.97%) |
| 6/30/2013 | 1,976,839,000 | 87,575,000 | 116,670,000 | (29,095,000) | (1.47%) |
| 6/30/2014 | 2,238,466,000 | 89,007,000 | 121,103,000 | (32,096,000) | (1.43%) |
| 6/30/2015 | 2,264,996,000 | 95,618,000 | 143,642,000 | (48,024,000) | (2.12%) |
| 6/30/2016 | 2,201,671,000 | 98,235,000 | 140,456,000 | (42,221,000) | (1.92%) |
| 6/30/2017 | 2,395,381,000 | 97,086,000 | 145,791,000 | (48,705,000) | (2.03%) |
| 6/30/2018 | 2,563,446,000 | 103,910,000 | 141,284,000 | (37,374,000) | (1.46%) |
| 6/30/2019 | 2,618,857,000 | 107,886,000 | 157,357,000 | (49,471,000) | (1.89%) |
| 6/30/2020 | 2,621,311,000 | 111,831,000 | 165,185,000 | (53,354,000) | (2.04%) |
| 6/30/2021 | 3,289,959,000 | 100,719,000 | 202,202,000 | (101,483,000) | (3.08%) |

Note: Years prior to the 6/30/2016 were provided by the prior actuary.



Oklahoma Police Pension and Retirement System

Table 12

Liability Maturity Measurement

Most public sector retirement systems have been in operation for many years. As a result, they have aging plan populations, and in some cases declining active populations, resulting in an increasing ratio of retirees to active members and a growing percentage of retiree liability. The retirement of the remaining baby boomers over the next decade is expected to further exacerbate the aging of the retirement system population. With more of the total liability residing with retirees, investment volatility has a greater impact on the funding of the system since it is more difficult to restore the system financially after losses occur when there is comparatively less payroll over which to spread costs.

Projections provide the most effective way of analyzing the impact of these changes on future funding measures, but studying several key metrics from the valuation can also provide some valuable insight. The removal of the COLA assumption in 2011 significantly affects the comparison of the results before and after that date.

| Year End | Retiree Liability (a) | Total Actuarial Accrued Liability (b) | Retiree Percentage (a) / (b) |
|-----------|--------------------------|---|------------------------------------|
| 6/30/2002 | \$930,334,502 | \$1,554,288,324 | 59.9% |
| 6/30/2003 | 959,714,377 | 1,646,979,675 | 58.3% |
| 6/30/2004 | 991,049,695 | 1,727,162,602 | 57.4% |
| 6/30/2005 | 1,012,642,020 | 1,811,572,114 | 55.9% |
| 6/30/2006 | 1,032,047,616 | 1,910,059,072 | 54.0% |
| 6/30/2007 | 1,059,888,219 | 2,035,653,471 | 52.1% |
| 6/30/2008 | 1,066,491,872 | 2,132,175,698 | 50.0% |
| 6/30/2009 | 1,091,714,246 | 2,253,133,775 | 48.5% |
| 6/30/2010 | 1,151,235,873 | 2,341,619,152 | 49.2% |
| 6/30/2011 | 979,617,905 | 1,959,976,006 | 50.0% |
| 6/30/2012 | 1,006,325,630 | 2,034,485,171 | 49.5% |
| 6/30/2013 | 1,058,739,933 | 2,131,172,172 | 49.7% |
| 6/30/2014 | 1,081,453,586 | 2,204,797,154 | 49.1% |
| 6/30/2015 | 1,132,081,248 | 2,269,073,426 | 49.9% |
| 6/30/2016 | 1,155,632,000 | 2,354,815,000 | 49.1% |
| 6/30/2017 | 1,193,676,000 | 2,403,073,000 | 49.7% |
| 6/30/2018 | 1,225,406,000 | 2,515,811,000 | 48.7% |
| 6/30/2019 | 1,266,287,000 | 2,612,473,000 | 48.5% |
| 6/30/2020 | 1,355,153,000 | 2,736,156,000 | 49.5% |
| 6/30/2021 | 1,458,644,000 | 2,810,243,000 | 51.9% |

Note: Years prior to the 6/30/2016 were provided by the prior actuary.

Retiree Liability does not include liability for DOP members.



Oklahoma Police Pension and Retirement System

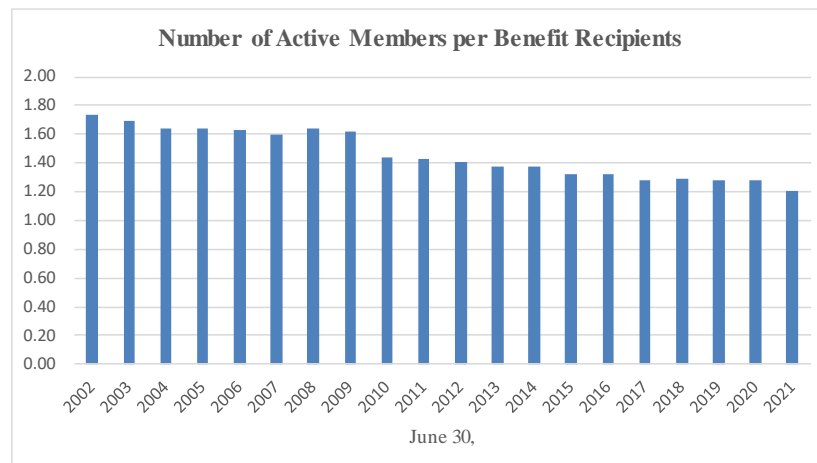
Table 13

Historical Member Statistics

| Valuation Date June 30, | Number of | | Active/ Retired |
|-------------------------------|-----------|----------|--------------------|
| | Active | Retired* | Retired |
| 2002 | 3,836 | 2,205 | 1.74 |
| 2003 | 3,880 | 2,290 | 1.69 |
| 2004 | 3,895 | 2,373 | 1.64 |
| 2005 | 4,016 | 2,447 | 1.64 |
| 2006 | 4,141 | 2,548 | 1.63 |
| 2007 | 4,247 | 2,650 | 1.60 |
| 2008 | 4,453 | 2,719 | 1.64 |
| 2009 | 4,497 | 2,785 | 1.61 |
| 2010 | 4,305 | 2,993 | 1.44 |
| 2011 | 4,368 | 3,060 | 1.43 |
| 2012 | 4,441 | 3,148 | 1.41 |
| 2013 | 4,467 | 3,239 | 1.38 |
| 2014 | 4,557 | 3,320 | 1.37 |
| 2015 | 4,570 | 3,448 | 1.33 |
| 2016 | 4,679 | 3,550 | 1.32 |
| 2017 | 4,695 | 3,658 | 1.28 |
| 2018 | 4,791 | 3,720 | 1.29 |
| 2019 | 4,902 | 3,815 | 1.28 |
| 2020 | 4,990 | 3,912 | 1.28 |
| 2021 | 4,920 | 4,082 | 1.21 |

*DOP members are not included for this analysis.

Note: Years prior to 6/30/2016 were provided by prior actuary.





SECTION 5 – RISK CONSIDERATIONS

Oklahoma Police Pension and Retirement System

Table 14

**Comparison of Valuation Results under Alternate Investment Return Assumptions
(\$ in Thousands)**

This exhibit compares the key July 1, 2021 valuation results under five different investment return assumptions to illustrate the impact of different assumptions on the funding of the System. Note that only the investment return assumption is changed, as identified in the heading below. All other assumptions are unchanged for purposes of this analysis.

| Investment Return Assumption | 7.00% | 7.25% | 7.50% | 7.75% | 8.00% |
|--|--------------|--------------|--------------|--------------|--------------|
| Contributions | | | | | |
| Normal Cost Rate | 22.7% | 21.6% | 20.5% | 19.5% | 18.5% |
| Amortization of Unfunded Actuarial Accrued Liability | 0.9% | (1.4%) | (3.0%) | (4.7%) | (6.4%) |
| Budgeted Expenses | 0.7% | 0.7% | 0.7% | 0.7% | 0.7% |
| Total Actuarial Required Contribution Rate | 24.3% | 20.9% | 18.2% | 15.5% | 12.8% |
| Less Member Contribution Rate | (8.0%) | (8.0%) | (8.0%) | (8.0%) | (8.0%) |
| Less Estimated Employer Contribution Rate | (13.0%) | (13.0%) | (13.0%) | (13.0%) | (13.0%) |
| Required State Contribution Rate | 3.3% | 0.0% | 0.0% | 0.0% | 0.0% |
| Required State Contribution Amount | \$11,587 | \$0 | \$0 | \$0 | \$0 |
| Actuarial Accrued Liabilities | \$2,953,693 | \$2,880,445 | \$2,810,243 | \$2,742,921 | \$2,678,324 |
| Actuarial Value of Assets | (2,940,118) | (2,940,118) | (2,940,118) | (2,940,118) | (2,940,118) |
| Unfunded Actuarial Accrued Liabilities | \$13,575 | (\$59,673) | (\$129,875) | (\$197,197) | (\$261,794) |
| Funded Ratio | 99.5% | 102.1% | 104.6% | 107.2% | 109.8% |

Note: All other assumptions are unchanged for purposes of this sensitivity analysis.



SECTION 6 – OTHER INFORMATION

Oklahoma Police Pension and Retirement System

In this section we have an exhibit showing the expected benefit payments for the System, an exhibit showing the Present Value of Accrued Benefits, and some historical information.

**Oklahoma Police Pension and Retirement System****Table 15****Projected Benefit Payments**

The table below shows estimated benefits expected to be paid over the next twenty years, based on the assumptions used in this valuation. The “Actives” column shows benefits expected to be paid to members currently active on July 1, 2021. The “Inactives” column shows benefits as of July 1, 2021 expected to be paid to all members receiving benefit payments or to members who have terminated employment and are entitled to a deferred vested benefit.

Retirement, Survivor and Withdrawal Benefits

| Year Ending June 30 | | Actives | | Inactives | | Total |
|--------------------------------|----|----------------|----|------------------|----|--------------|
| 2022 | \$ | 70,903,000 | \$ | 138,395,000 | \$ | 209,298,000 |
| 2023 | | 64,409,000 | | 137,411,000 | | 201,820,000 |
| 2024 | | 69,334,000 | | 136,229,000 | | 205,563,000 |
| 2025 | | 75,109,000 | | 134,957,000 | | 210,066,000 |
| 2026 | | 79,248,000 | | 133,484,000 | | 212,732,000 |
| 2027 | | 86,311,000 | | 131,973,000 | | 218,284,000 |
| 2028 | | 94,757,000 | | 130,269,000 | | 225,026,000 |
| 2029 | | 101,660,000 | | 128,329,000 | | 229,989,000 |
| 2030 | | 113,052,000 | | 126,202,000 | | 239,254,000 |
| 2031 | | 122,581,000 | | 123,904,000 | | 246,485,000 |
| 2032 | | 130,727,000 | | 121,394,000 | | 252,121,000 |
| 2033 | | 139,371,000 | | 118,679,000 | | 258,050,000 |
| 2034 | | 148,158,000 | | 115,802,000 | | 263,960,000 |
| 2035 | | 156,161,000 | | 112,752,000 | | 268,913,000 |
| 2036 | | 164,120,000 | | 109,619,000 | | 273,739,000 |
| 2037 | | 179,781,000 | | 106,331,000 | | 286,112,000 |
| 2038 | | 190,720,000 | | 102,897,000 | | 293,617,000 |
| 2039 | | 204,548,000 | | 99,350,000 | | 303,898,000 |
| 2040 | | 217,341,000 | | 95,692,000 | | 313,033,000 |
| 2041 | | 232,359,000 | | 91,932,000 | | 324,291,000 |

**Oklahoma Police Pension and Retirement System****Table 16****Present Value of Accumulated System Benefits**

The actuarial present value of accumulated vested and non-vested system benefits was computed on an ongoing System basis to provide information that generally complies with FASB Accounting Standards Codification (ASC 960). While ASC 960 is not directly applicable to public retirement systems, the information is included to allow for historical comparisons.

In this calculation, the benefits valued are based on the present salary and service information for each member. Eligibility for retirement and other future benefits takes into consideration future service as assumed by the System's demographic assumptions. The liabilities presented here may not be appropriate to reflect the settlement obligations of the System, nor are they necessarily appropriate for information regarding the funding of the System.

| | July 1, 2021 | July 1, 2020 |
|---|----------------------|----------------------|
| Accumulated System Benefits | | |
| Vested Benefits | | |
| a. Active Members | \$841,557,000 | \$870,416,000 |
| b. Deferred Option Plan Members | 2,451,000 | 3,001,000 |
| c. Vested Terminated Members | 24,737,000 | 25,758,000 |
| d. Members Receiving Benefits | <u>1,458,644,000</u> | <u>1,355,153,000</u> |
| e. Total Vested Benefits | \$2,327,389,000 | \$2,254,328,000 |
| Non-vested Benefits | <u>277,787,000</u> | <u>283,214,000</u> |
| Total Accumulated System Benefits (PVAB) | \$2,605,176,000 | \$2,537,542,000 |
| Market Value of Assets Available for Benefits (MVA) | \$3,289,959,000 | \$2,621,311,000 |
| Funded Ratio (MVA / PVAB) | 126.3% | 103.3% |
| Assumed Rate of Interest | 7.50% | 7.50% |

**Oklahoma Police Pension and Retirement System****Table 17****Historical Investment Returns**

Historical asset return information may be useful in explaining the current funded status of the System.

| FYE June 30 | Actuarial Value | | | Market Value | | |
|----------------|-----------------|------------|----------|--------------|------------|----------|
| | Annual | Cumulative | 10 Years | Annual | Cumulative | 10 Years |
| 1992 | 8.7% | 8.7% | | 13.8% | 13.8% | |
| 1993 | 10.3% | 9.5% | | 15.1% | 14.4% | |
| 1994 | 9.3% | 9.4% | | 0.0% | 9.4% | |
| 1995 | 11.0% | 9.8% | | 17.7% | 11.4% | |
| 1996 | 11.9% | 10.2% | | 13.5% | 11.8% | |
| 1997 | 12.8% | 10.7% | | 17.3% | 12.7% | |
| 1998 | 13.5% | 11.1% | | 16.9% | 13.3% | |
| 1999 | 14.3% | 11.5% | | 9.7% | 12.9% | |
| 2000 | 12.8% | 11.6% | | 8.7% | 12.4% | |
| 2001 | 8.8% | 11.3% | 11.3% | (5.3%) | 10.5% | 10.5% |
| 2002 | 4.9% | 10.7% | 10.9% | (5.6%) | 8.9% | 8.4% |
| 2003 | 2.7% | 10.0% | 10.1% | 3.5% | 8.5% | 7.3% |
| 2004 | 3.3% | 9.5% | 9.5% | 15.0% | 8.9% | 8.8% |
| 2005 | 3.0% | 9.0% | 8.7% | 8.7% | 8.9% | 7.9% |
| 2006 | 6.1% | 8.8% | 8.1% | 11.0% | 9.1% | 7.7% |
| 2007 | 10.6% | 8.9% | 7.9% | 17.3% | 9.6% | 7.7% |
| 2008 | 8.9% | 8.9% | 7.5% | (2.4%) | 8.8% | 5.8% |
| 2009 | (0.9%) | 8.4% | 5.9% | (16.4%) | 7.2% | 2.9% |
| 2010 | 4.4% | 8.1% | 5.1% | 11.7% | 7.5% | 3.2% |
| 2011 | 5.6% | 8.0% | 4.8% | 18.3% | 8.0% | 5.5% |
| 2012 | 2.6% | 7.8% | 4.6% | 0.5% | 7.6% | 6.2% |
| 2013 | 5.4% | 7.6% | 4.9% | 12.5% | 7.8% | 7.1% |
| 2014 | 11.4% | 7.8% | 5.6% | 15.0% | 8.1% | 7.1% |
| 2015 | 9.3% | 7.9% | 6.3% | 3.4% | 7.9% | 6.6% |
| 2016 | 6.2% | 7.8% | 6.3% | (0.9%) | 7.6% | 5.4% |
| 2017 | 7.5% | 7.8% | 6.0% | 11.1% | 7.7% | 4.8% |
| 2018 | 7.3% | 7.8% | 5.8% | 8.6% | 7.7% | 5.9% |
| 2019 | 5.5% | 7.7% | 6.5% | 4.1% | 7.6% | 8.3% |
| 2020 | 5.0% | 7.6% | 6.6% | 2.2% | 7.4% | 7.3% |
| 2021 | 10.5% | 7.7% | 7.0% | 30.0% | 8.1% | 8.3% |

Note: Returns prior to 2016 were prepared by the prior actuary.



SECTION 6 – OTHER INFORMATION

Oklahoma Police Pension and Retirement System

Table 18

Solvency Test

| Valuation Year | Aggregate Accrued Liabilities For | | | Valuation Assets | Portion of Accrued Liabilities Covered by Assets | | |
|-------------------|-----------------------------------|-------------------------------|---|---------------------|--|------|-------|
| | (1) | (2) | (3) | | (1) | (2) | (3) |
| | Active Member Contributions | Retirees and Beneficiaries | Active and Terminated Vested Members (Employer Financed Portion) | | | | |
| 2010 | \$174,025,925 | \$1,111,074,787 | \$1,056,518,440 | \$1,754,372,000 | 100% | 100% | 44.4% |
| 2011 | 184,781,373 | 944,081,922 | 831,112,711 | 1,822,702,000 | 100 | 100 | 83.5 |
| 2012 | 189,459,953 | 983,507,261 | 861,517,957 | 1,834,170,000 | 100 | 100 | 76.7 |
| 2013 | 199,233,453 | 1,037,456,527 | 894,482,192 | 1,902,581,000 | 100 | 100 | 74.4 |
| 2014 | 209,576,572 | 1,057,853,545 | 937,367,037 | 2,086,297,000 | 100 | 100 | 87.4 |
| 2015 | 214,685,883 | 1,112,855,884 | 941,531,659 | 2,229,272,000 | 100 | 100 | 95.8 |
| 2016 | 223,255,000 | 1,176,401,000 | 955,159,000 | 2,323,407,000 | 100 | 100 | 96.7 |
| 2017 | 238,151,000 | 1,193,676,000 | 971,246,000 | 2,447,351,000 | 100 | 100 | 104.6 |
| 2018 | 245,909,000 | 1,225,406,000 | 1,044,496,000 | 2,586,061,000 | 100 | 100 | 106.7 |
| 2019 | 251,559,000 | 1,266,287,000 | 1,094,627,000 | 2,677,255,000 | 100 | 100 | 105.9 |
| 2020 | 258,774,000 | 1,358,154,000 | 1,119,228,000 | 2,756,877,000 | 100 | 100 | 101.9 |
| 2021 | 257,254,000 | 1,461,095,000 | 1,091,894,000 | 2,940,118,000 | 100 | 100 | 111.9 |



APPENDIX A – SUMMARY OF SYSTEM PROVISIONS

| | |
|--------------------------------------|---|
| Effective Date and Plan Year: | The System became effective July 1, 1981 and has been amended periodically since then. The plan year is July 1 to June 30. |
| Administration: | The System is administered by the Oklahoma Police Pension Retirement Board consisting of thirteen members. The Board shall be responsible for the policies and rules for the general administration of the System. |
| Plan Type: | Defined benefit plan. |
| Employers Included: | An eligible employer may join the System on the first day of any month. An application of affiliation must be filed in the form of a resolution before the eligible municipality can become a participating municipality. |
| Eligibility: | All persons employed full-time as officers working more than 25 hours per week or any person undergoing police training to become a permanent police officer with a police department of a participating municipality, with ages not less than twenty-one (21) nor more than forty-five (45) when accepting membership. |
| Salary Considered: | Base salary used in the determination of benefits does not include payment for accumulated sick and annual leave upon termination of employment or any uniform allowances. |
| Final Average Salary: | Final average salary means the average paid base salary for normally scheduled hours of an officer over the highest 30 consecutive months of the last 60 months of credited service. |
| Service Considered: | Credited service consists of the period during which the member participated in the System or predecessor municipal pay as an active employee, plus any service prior to the establishment of the municipal plan which was credited under the predecessor municipal systems of credited service granted by the State Board, plus any applicable military service. |
| State Contributions: | Insurance premium tax allocation. Historically, the System has received 14% of these collected taxes. For FY 2005 through FY 2009, the System received 17% of these collected taxes. For the period beginning July 1, 2009 and ending August 31, 2020, the System received 14% of these collected taxes. For the period beginning September 1, 2020 through June 30, 2021, the System received 9.8% of these collected taxes. For FY 2022, 14% of the taxes collected will be allocated to the System. For FY 2023 through FY 2027, 14.7% of the taxes collected will be allocated to the System. For the following fiscal years, 14% of the taxes collected will be allocated to the System. |



APPENDIX A – SUMMARY OF SYSTEM PROVISIONS

Beginning in FY 2006, the System began receiving 26% of a special allocation established to refund the System for reduced allocations of insurance premium taxes resulting from increases in insurance premium tax credits. For the period beginning September 1, 2020 through June 30, 2021, the System received 18.2% of the insurance premium tax allocation. For FY 2022 and thereafter, the System will receive 26% of the insurance premium tax allocation. Beginning in fiscal year July, 1 2010, the amount of insurance premium tax apportioned to the System will be applied prior to the calculation of the Home Office Credit.

In addition to these allocations, the System will receive \$16,250 annually for FY 2023 through FY 2027.

Member Contributions: 8% of paid salary. These contributions shall “be picked up” after December 31, 1988 pursuant to Section 414(h)(2) of the Internal Revenue Code.

Municipality Contributions: Contribution is 13% of paid salary as of July 1, 1996.

Normal Retirement Benefit:

Normal Retirement Eligibility: 20 years of credited service.

Benefit Amount: 2 1/2% of the final average salary multiplied by the years of credited service, with a maximum of 30 years of credited service considered.

Normal Form of Benefit: The benefit is paid as a Joint and 100% Survivor Annuity if the member was married 30 months prior to death.

Termination Benefit:

Less than 10 Years of Service: Refund of member contributions without interest.

More than 10 Years of Service: If greater than 10 years of service, but not eligible for the normal retirement benefit, the benefit is payable at the later of the date the member would have had 20 years of service and the date the member reaches age 50. The benefit amount is equal to 2 1/2% of the greater of (i) final average salary or (ii) the salary paid to active employees as described under “salary considered” multiplied by the number of years and completed months of credited service.



APPENDIX A – SUMMARY OF SYSTEM PROVISIONS

Disability Benefit (Duty):

Total Disability

Upon determination of disability incurred as a result of the performance of duty, the normal disability benefit is 50% of final average salary.

Partial Disability

Upon determination of partial disability incurred as a result of the performance of duty, the normal disability is reduced according to the percentage of impairment, as outlined in the “American Medical Association’s Guide to the Evaluation of Permanent Impairment.” The following shows the percent of normal disability benefit payable as related to the percent of impairment.

| <u>% Impairment</u> | <u>% of Benefit</u> |
|---------------------|---------------------|
| 1% to 49% | 50% |
| 50% to 74% | 75% |
| 75% to 100% | 100% |

Disability Benefit (Non-Duty):

Upon determination of disability after 10 years of service due to causes other than duty, the benefit equals the accrued benefit of 2 ½% of final average salary times years of credited service (maximum of 30 years) times:

- 100%, if permanent and total, or
- The following percentages, if partial disability:

| <u>% Impairment</u> | <u>% of Benefit</u> |
|---------------------|---------------------|
| 1% to 24% | 25% |
| 25% to 49% | 50% |
| 50% to 74% | 75% |
| 75% to 99% | 90% |

Upon determination of disability with less than 10 years of service due to causes other than duty, a refund of member contributions without interest will be paid.



APPENDIX A – SUMMARY OF SYSTEM PROVISIONS

Death Benefits Payable to Beneficiaries:

| | |
|---|--|
| Prior to Retirement (Duty): | The greater of: 1) 2 ½% of final average salary times years of credited service (maximum of 30 years), or 2) 50% of final average salary. |
| Prior to Retirement (Non-Duty): | After 10 years of service, a benefit equal to 2 ½% of final average salary times years of credited service (maximum if 30 years). Prior to 10 years of service, a refund of the accumulated contributions made by the member will be paid to the estate. |
| After Retirement or Vested Termination: | 100% of the member's retirement or deferred vested benefit, payable when the member would have been eligible to receive it, payable to the beneficiary. |
| Lump Sum: | The beneficiary shall receive a lump-sum amount of \$5,000. |
| Beneficiary Eligibility: | Surviving spouses must be married to the member 30 months prior to the date of death (waived in the case of duty related death). If the beneficiary is a child, the benefits are payable to age 18, or to age 22 if a full-time student. If the beneficiary is a spouse to whom the member was married for at least 30 months prior to death, if the death was not duty related, the benefits are payable for life. |

| | |
|------------------------------------|--|
| Postretirement Adjustments: | Police officers eligible to receive increased benefits according to repealed Section 50-120 of Title 11 of the Oklahoma Statutes pursuant to a court order receive an adjustment of ⅓ or ½ of the increase or decrease of any adjustment to the base salary of a regular police officer. |
|------------------------------------|--|

| | |
|------------------------------|---|
| Deferred Option Plan: | A member with 20 or more years of service may elect to participate in the Deferred Option Plan (DOP). Participation in the DOP shall not exceed five years. The member's contributions cease upon entering the DOP, but the agency contributions are divided equally between the Retirement System and Deferred Option Plan. The monthly retirement benefits that the member is eligible to receive are paid into the Deferred Option Plan account. |
|------------------------------|---|

Members can elect to retroactively join the DOP as of a back-DOP-date which is no earlier than the member's normal retirement date or five years before his termination date. The



APPENDIX A – SUMMARY OF SYSTEM PROVISIONS

monthly retirement benefits and employee contributions that would have been payable had the member elected to join the DOP are credited to the member's DOP account with interest.

The retirement benefits are not recalculated for service and salary earned after the election date to join the Deferred Option Plan. However, the benefits are increased by cost-of-living increases applicable to retired members during the DOP period.

When the member actually terminates employment, the Deferred Option Plan account balance may be paid in a lump sum or to an annuity provider. Monthly retirement benefits are then paid directly to the retired member.

This Plan became effective during the July 1, 1991 to June 30, 1992 Plan Year. The Deferred Option Plan account is guaranteed a minimum of the valuation interest rate for investment return, or 2% less than the fund rate of return, if greater.



Actuarial Cost Method

Liabilities and contributions shown in this report are computed using the Individual Entry Age method of funding. Sometimes called the “funding method,” this is a particular technique used by actuaries for establishing the amount of the annual actuarial cost of pension benefits, or normal cost, and the related unfunded actuarial accrued liability. Ordinarily the annual contribution to the System is comprised of (1) the normal cost; and (2) an amortization payment on the unfunded actuarial accrued liability.

Under the Entry Age Actuarial Cost Method, the **Normal Cost** is computed as the level percentage of pay which, if paid from the earliest time each member would have been eligible to join the System had it existed (thus entry age) until his retirement or termination, would accumulate with interest at the rate assumed in the valuation to a fund sufficient to pay all benefits under the System.

The **Actuarial Accrued Liability** under this method, at any point in time, is the theoretical amount of the fund that would have accumulated had annual contributions equal to the normal cost been made in prior years (it does not represent the liability for benefits accrued to the valuation date). The **Unfunded Actuarial Accrued Liability** is the excess of the actuarial accrued liability over the actuarial value of System assets on the valuation date.

Under this method, experience gains or losses, i.e. decreases or increases in actuarial accrued liabilities attributable to deviations in experience from the actuarial assumptions, adjust the unfunded actuarial accrued liability.

Asset Valuation Method

The actuarial value of assets is based on a five-year moving average of expected and actual market values determined as follows:

- at the beginning of each fiscal year, a preliminary expected actuarial asset value is calculated as the sum of the previous year’s actuarial value increased with a year’s interest at the System valuation rate plus net cash flow adjusted for interest (at the same rate) to the end of the previous fiscal year;
- the expected actuarial asset value is set equal to the preliminary expected actuarial value plus the unrecognized investment gains and losses as of the beginning of the previous fiscal year;
- the difference between the expected actuarial asset value and the market value is the investment gain or loss for the previous year;
- the (final) actuarial asset value is the preliminary value plus 20% of the investment gains and losses for each of the five previous fiscal years, but in no case more than 120% of the market value or less than 80% of the market value.

Amortization Method

The unfunded actuarial accrued liability is amortized as a level dollar amount over a 5-year open period. Surplus, if any, is amortized as a level dollar amount over a 30-year open period.



Valuation Procedures

The wages used in the projection of benefits and liabilities are pay for the year ending June 30, 2021 (including longevity bonuses). These amounts were projected into the valuation year using the valuation salary scale.

In computing accrued benefits, average earnings were determined using the valuation salary scale. Historical earnings for the past five years have been retained.

Retired members were assumed to be married according to the probability of marriage assumption. For those in the Baker group, the assumption is 100% married.

The impact from compensation limit under IRC Section 401(a)(17) and from the dollar limitation required by the Internal Revenue Code Section 415 for governmental plans were considered in this valuation and was determined to be *de minimis*.

The calculations for the required state contribution are determined as of mid-year. Since the agency contributions, member contributions and State insurance premium tax allocations are made on a monthly basis throughout the year, a mid-year determination date represents an average weighting of the contributions.



APPENDIX B – ACTUARIAL ASSUMPTIONS AND METHODS

Economic Assumptions

1. Inflation 2.75%, per annum, compound annually.
2. Investment Return 7.50%, net of investment expenses, per annum, compounded annually.
3. Salary Scale

| Attained Service | Inflation % | Merit % | Increase % |
|------------------|-------------|---------|------------|
| 0 | 3.50 | 8.50 | 12.00 |
| 1 | 3.50 | 6.50 | 10.00 |
| 2 | 3.50 | 5.50 | 9.00 |
| 3 | 3.50 | 4.50 | 8.00 |
| 4-6 | 3.50 | 4.00 | 7.50 |
| 7 | 3.50 | 3.75 | 7.25 |
| 8 | 3.50 | 3.50 | 7.00 |
| 9 | 3.50 | 3.25 | 6.75 |
| 10-12 | 3.50 | 3.00 | 6.50 |
| 13 | 3.50 | 2.00 | 5.50 |
| 14 | 3.50 | 1.25 | 4.75 |
| 15 | 3.50 | 0.75 | 4.25 |
| 16-25 | 3.50 | 0.25 | 3.75 |
| 26+ | 3.50 | 0.00 | 3.50 |

Demographic Assumptions

1. Retirement Rates Sample rates are shown below:

| Attained Service | Annual Rates of Retirement |
|------------------|----------------------------|
| 20 | 15% |
| 21 | 8 |
| 22 | 8 |
| 23 | 8 |
| 24 | 8 |
| 25 | 20 |
| 26 | 10 |
| 27 | 10 |
| 28 | 10 |
| 29 | 15 |
| 30 | 20 |
| 31 | 30 |
| 32 | 40 |
| 33 | 50 |
| 34 | 75 |
| 35 | 100 |



APPENDIX B – ACTUARIAL ASSUMPTIONS AND METHODS

2. Mortality Rates

- (a) Active participants RP-2000 Combined Blue Collar Healthy Employees (generational using Scale AA) with age set back four years
- (b) Active participants (post-retirement) and nondisabled pensioners RP-2000 Combined Blue Collar Healthy Employees (generational using Scale AA)
- (c) Disabled pensioners RP-2000 Combined Blue Collar Healthy Employees with age set forward four years (no generational improvement)

3. Disability Rates

Sample rates are shown below:

| Age | Rate |
|---------|-------|
| 20-24 | 0.02% |
| 25-29 | 0.02 |
| 30-34 | 0.04 |
| 35-39 | 0.06 |
| 40-44 | 0.08 |
| 45-49 | 0.10 |
| 50-54 | 0.12 |
| Over 55 | 0.14 |

4. Withdrawal Rates

Sample rates are shown below:

| Service Range | Rate |
|---------------|-------|
| 0 | 15.0% |
| 1 | 12.0 |
| 2 | 10.0 |
| 3 | 8.0 |
| 4 | 7.0 |
| 5 | 6.0 |
| 6 | 5.0 |
| 7 | 4.5 |
| 8 | 4.0 |
| 9 | 3.5 |
| 10 | 3.0 |
| 11 | 2.5 |
| 12 | 2.0 |
| 13 | 1.5 |
| 14-20 | 1.0 |
| Over 20 | 0.0 |



APPENDIX B – ACTUARIAL ASSUMPTIONS AND METHODS

5. Marital Status

- (a) Percentage married: Males: 85%; Females: 85%
- (b) Age difference: Males are assumed to be three (3) years older than females.

Other Assumptions:

1. Deferred Benefits Begin at: Age 50, or the date at which the participant would have achieved 20 years of service, if later.
2. Provision for Expenses: Administrative Expenses, as budgeted by the Oklahoma Police Pension and Retirement System.
3. Percentage of Disability: Members becoming disabled have a 50%-74% impairment.
4. Duty-Related Death: All pre-retirement deaths are duty-related.
5. Cost-of-Living Allowance: Police officers eligible to receive increased benefits according to repealed Section 50-120 of Title 11 of the Oklahoma Statutes pursuant to a court order receive an adjustment of 1/3 to 1/2 of the increase or decrease of any adjustment to the base salary of a regular police officer, based on an increase in base salary of 3.5% (wage inflation).
6. Deferred Option Plan: Members currently participating in the Deferred Option Plan (DOP) are assumed to remain in the DOP for the maximum of five years. Active members leaving active service are assumed to retroactively elect to join the DOP for the maximum allowable period. DOP account balances are assumed to accumulate at 11% (to reflect the interest rate guarantee prior to retirement) for future BackDOP elections and members are assumed to elect a lump sum at retirement. All balances held in Deferred Option payout accounts are assumed to be paid immediately upon the end of employment.



APPENDIX C – DATA

Oklahoma Police Pension and Retirement System

Member Data Reconciliation

| | <u>Active Members</u> | <u>Terminated Refund Due</u> | <u>Terminated Deferred</u> | <u>DOP Members</u> | <u>Retirees</u> | <u>Disability Retirees</u> | <u>Beneficiaries</u> | <u>Total Members</u> |
|---------------------------|---------------------------|----------------------------------|--------------------------------|------------------------|-----------------|--------------------------------|----------------------|--------------------------|
| As of July 1, 2020 | 4,990 | 899 | 161 | 2 | 2,954 | 130 | 828 | 9,964 |
| New Participants | 368 | 45 | 0 | 0 | 0 | 0 | 26 | 439 |
| Terminations | | | | | | | | |
| - Refunded | (100) | (57) | (2) | 0 | 0 | 0 | 0 | (159) |
| - Refund Due | (146) | 146 | 0 | 0 | 0 | 0 | 0 | 0 |
| - Deferred Benefit | (23) | 0 | 23 | 0 | 0 | 0 | 0 | 0 |
| Retirements | | | | | | | | |
| - Disability | (5) | 0 | 0 | 0 | 0 | 5 | 0 | 0 |
| - Deferred Option Plan | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| - Age and Service | (202) | 0 | (19) | (1) | 222 | 0 | 0 | 0 |
| Deaths | | | | | | | | |
| - With Beneficiary | (1) | 0 | 0 | 0 | (55) | (1) | 57 | 0 |
| - Without Beneficiary | (1) | 0 | 0 | 0 | (33) | (2) | (49) | (85) |
| Data adjustments | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 3 |
| Rehires | 40 | (30) | (10) | 0 | 0 | 0 | 0 | 0 |
| As of July 1, 2021 | 4,920 | 1,003 | 156 | 1 | 3,088 | 132 | 862 | 10,162 |

Note: For purposes of this exhibit, QDROs are included in the beneficiary counts.



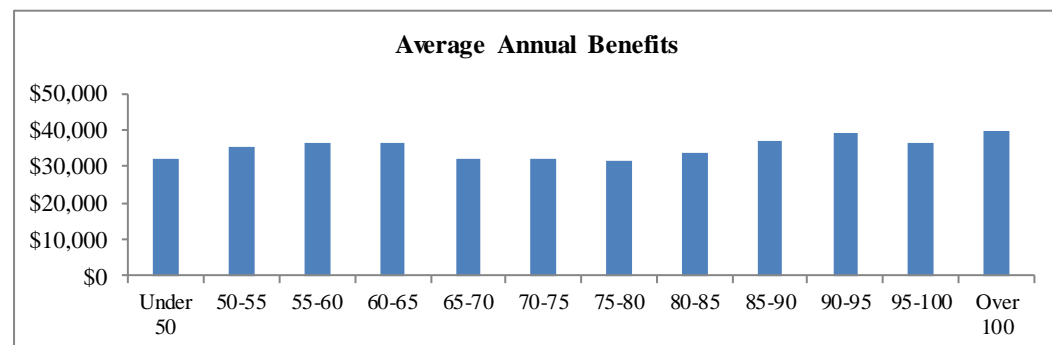
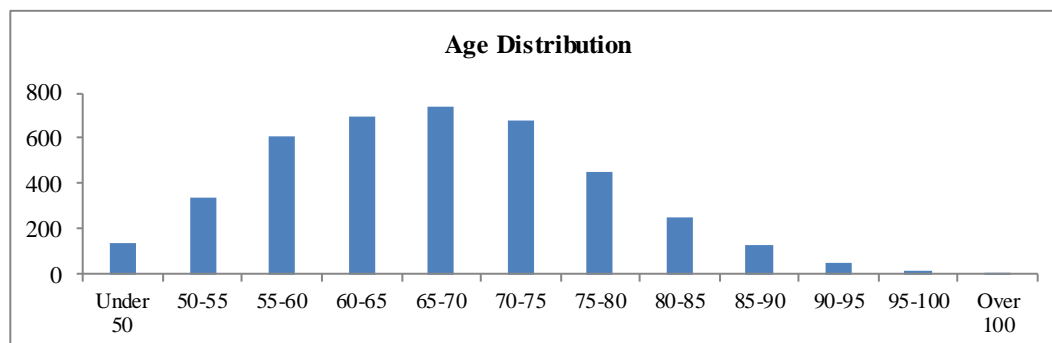
APPENDIX C – DATA

Oklahoma Police Pension and Retirement System Valuation Data Distribution - Actives

| Age | Years of Service | | | | | | | | | |
|--------------------------------|-------------------|-------------------|-----------------|-----------------|-----------------|-----------------|-----------------|----------------|----------------|-------------------|
| | 0 to 4 | 5 to 9 | 10 to 14 | 15 to 19 | 20 to 24 | 25 to 29 | 30 to 34 | 35 to 39 | 40 & Up | Total |
| Under 25 Avg. Pay | 169 \$42,551 | | | | | | | | | 169 \$42,551 |
| 25 to 29 Avg. Pay | 630 \$47,001 | 102 \$60,334 | | | | | | | | 732 \$48,859 |
| 30 to 34 Avg. Pay | 386 \$46,666 | 379 \$62,912 | 51 \$72,854 | | | | | | | 816 \$55,848 |
| 35 to 39 Avg. Pay | 222 \$46,153 | 299 \$64,632 | 272 \$74,404 | 72 \$86,718 | | | | | | 865 \$64,801 |
| 40 to 44 Avg. Pay | 103 \$46,226 | 129 \$60,499 | 157 \$74,374 | 273 \$84,252 | 46 \$94,292 | | | | | 708 \$72,854 |
| 45 to 49 Avg. Pay | 46 \$44,547 | 57 \$57,649 | 96 \$68,039 | 184 \$79,808 | 311 \$89,008 | 19 \$87,956 | | | | 713 \$78,407 |
| 50 to 54 Avg. Pay | 9 \$50,640 | 40 \$57,997 | 47 \$63,529 | 89 \$75,629 | 150 \$87,427 | 158 \$95,966 | 34 \$102,590 | | | 527 \$83,980 |
| 55 to 59 Avg. Pay | 4 \$38,018 | 1 \$37,568 | 16 \$61,905 | 32 \$79,958 | 68 \$81,230 | 63 \$93,567 | 110 \$95,072 | 7 \$97,299 | | 301 \$87,363 |
| 60 & up Avg. Pay | | | 2 \$58,160 | 10 \$69,652 | 27 \$79,534 | 15 \$83,594 | 18 \$98,896 | 13 \$98,983 | 4 \$115,965 | 89 \$87,022 |
| Total Avg. Pay | 1,569 \$46,195 | 1,007 \$62,334 | 641 \$72,160 | 660 \$81,690 | 602 \$87,714 | 255 \$94,049 | 162 \$97,075 | 20 \$98,394 | 4 \$115,965 | 4,920 \$67,147 |

**Oklahoma Police Pension and Retirement System****Retirees, Beneficiaries, & Disableds**

| Age | Number | | | Annual Benefits | | |
|----------|--------|--------|-------|-----------------|---------------|----------------|
| | Male | Female | Total | Male | Female | Total |
| Under 50 | 97 | 42 | 139 | \$ 3,369,016 | \$ 1,074,538 | \$ 4,443,554 |
| 50-55 | 271 | 65 | 336 | 9,946,262 | 1,840,043 | 11,786,305 |
| 55-60 | 469 | 136 | 605 | 18,015,632 | 3,856,284 | 21,871,916 |
| 60-65 | 536 | 158 | 694 | 20,675,680 | 4,467,476 | 25,143,156 |
| 65-70 | 562 | 177 | 739 | 19,375,855 | 4,361,590 | 23,737,445 |
| 70-75 | 477 | 198 | 675 | 16,002,222 | 5,519,646 | 21,521,868 |
| 75-80 | 311 | 138 | 449 | 9,841,308 | 4,216,298 | 14,057,606 |
| 80-85 | 135 | 113 | 248 | 4,622,895 | 3,774,011 | 8,396,906 |
| 85-90 | 73 | 55 | 128 | 2,639,609 | 2,073,500 | 4,713,109 |
| 90-95 | 17 | 36 | 53 | 682,688 | 1,392,537 | 2,075,225 |
| 95-100 | 4 | 10 | 14 | 137,693 | 373,179 | 510,872 |
| Over 100 | 1 | 1 | 2 | 41,679 | 37,436 | 79,115 |
| Total | 2,953 | 1,129 | 4,082 | \$ 105,350,539 | \$ 32,986,538 | \$ 138,337,077 |





Oklahoma Police Pension and Retirement System

Deferred Vesteds

| Age | Number | | | Annual Benefits | | |
|----------|--------|--------|-------|-----------------|------------|--------------|
| | Male | Female | Total | Male | Female | Total |
| Under 35 | 0 | 0 | 0 | \$ 0 | \$ 0 | \$ 0 |
| 35-40 | 12 | 3 | 15 | 162,091 | 39,437 | 201,528 |
| 40-45 | 40 | 8 | 48 | 694,482 | 136,826 | 831,308 |
| 45-50 | 47 | 8 | 55 | 919,949 | 174,218 | 1,094,167 |
| 50-55 | 23 | 3 | 26 | 423,843 | 58,286 | 482,129 |
| Over 55 | 11 | 1 | 12 | 192,951 | 14,163 | 207,114 |
| Total | 133 | 23 | 156 | \$ 2,393,316 | \$ 422,930 | \$ 2,816,246 |

DOP Participants

| Age | Number | | | Annual Benefits | | |
|----------|--------|--------|-------|-----------------|--------|-----------|
| | Male | Female | Total | Male | Female | Total |
| Under 50 | 0 | 0 | 0 | \$ 0 | \$ 0 | \$ 0 |
| 50-55 | 0 | 0 | 0 | 0 | 0 | 0 |
| 55-60 | 1 | 0 | 1 | 67,300 | 0 | 67,300 |
| Over 60 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total | 1 | 0 | 1 | \$ 67,300 | \$ 0 | \$ 67,300 |



Oklahoma Police Pension and Retirement System

| | Actuarial Valuation as of | | % Change |
|--|---------------------------|----------------|----------|
| | 7/1/2021 | 7/1/2020 | |
| 1. Active members | | | |
| a. Number | 4,920 | 4,990 | (1.4%) |
| b. Annual compensation | \$ 330,363,918 | \$ 331,070,706 | (0.2%) |
| c. Average annual compensation | \$ 67,147 | \$ 66,347 | 1.2% |
| d. Average age | 39.6 | 39.7 | (0.3%) |
| e. Average service | 11.5 | 11.7 | (1.7%) |
| 2. Non-vested terminated members | | | |
| a. Number | 1,003 | 899 | 11.6% |
| b. Total contribution balances | \$ 4,473,052 | \$ 3,842,952 | 16.4% |
| c. Average balance | \$ 4,460 | \$ 4,275 | 4.3% |
| 3. Vested terminated members | | | |
| a. Number | 156 | 161 | (3.1%) |
| b. Annual deferred benefits | \$ 2,816,246 | \$ 2,902,238 | (3.0%) |
| c. Average annual deferred benefit | \$ 18,053 | \$ 18,026 | 0.1% |
| 4. Retired members | | | |
| a. Number | 3,088 | 2,954 | 4.5% |
| b. Annual retirement benefits | \$ 111,937,401 | \$ 104,389,862 | 7.2% |
| c. Average annual retirement benefit | \$ 36,249 | \$ 35,338 | 2.6% |
| 5. Beneficiaries* | | | |
| a. Number | 862 | 828 | 4.1% |
| b. Annual retirement benefits | \$ 24,022,484 | \$ 23,145,126 | 3.8% |
| c. Average annual retirement benefit | \$ 27,868 | \$ 27,953 | (0.3%) |
| 6. Disabled members | | | |
| a. Number | 132 | 130 | 1.5% |
| b. Annual retirement benefits | \$ 2,377,192 | \$ 2,316,608 | 2.6% |
| c. Average annual retirement benefit | \$ 18,009 | \$ 17,820 | 1.1% |
| 7. DOP Participants | | | |
| a. Number | 1 | 2 | (50.0%) |
| b. Annual retirement benefits | \$ 67,300 | \$ 128,892 | (47.8%) |
| c. Average annual retirement benefit | \$ 67,300 | \$ 64,446 | 4.4% |
| 8. Total members included in valuation | 10,162 | 9,964 | 2.0% |

* Includes QDROs



APPENDIX C – DATA

Oklahoma Police Pension and Retirement System

| Year Ended | Added to Rolls | | Removed from Rolls | | Rolls end of Year* | | | Average Annual Benefits |
|------------|----------------|-----------------|--------------------|-----------------|--------------------|-----------------|------------|-------------------------|
| | No. | Annual Benefits | No. | Annual Benefits | No. | Annual Benefits | % Increase | |
| 2012 | 139 | \$4,587,513 | 51 | \$1,073,612 | 3,148 | \$91,197,782 | 4.0% | \$28,970 |
| 2013 | 151 | 4,773,719 | 60 | 694,596 | 3,239 | 95,276,905 | 4.5% | 29,416 |
| 2014 | 123 | 3,873,758 | 42 | 1,303,391 | 3,320 | 97,847,272 | 2.7% | 29,472 |
| 2015 | 175 | 6,613,773 | 47 | 947,483 | 3,448 | 103,513,562 | 5.8% | 30,021 |
| 2016 | 175 | 6,489,659 | 73 | 2,024,379 | 3,550 | 107,978,842 | 4.3% | 30,417 |
| 2017 | 181 | 6,601,023 | 73 | 2,234,813 | 3,658 | 112,345,052 | 4.0% | 30,712 |
| 2018 | 177 | 6,561,513 | 115 | 3,252,707 | 3,720 | 115,653,858 | 2.9% | 31,090 |
| 2019 | 184 | 7,351,430 | 89 | 2,766,637 | 3,815 | 120,238,651 | 4.0% | 31,517 |
| 2020 | 213 | 8,778,156 | 116 | 3,416,592 | 3,912 | 129,851,595 | 8.0% | 33,193 |
| 2021 | 310 | 12,844,091 | 140 | 4,358,609 | 4,082 | 138,337,077 | 6.5% | 33,890 |

* Annual benefits at the end of the year may not add due to ad hoc COLAs.



APPENDIX C – DATA

Oklahoma Police Pension and Retirement System

| Retirement Effective Dates July 1, 2011 to June 30, 2021 | Years of Credited Service | | | | |
|---|---------------------------|----------|----------|----------|----------|
| | 10 - 15 | 15 - 20 | 20 - 25 | 25 - 30 | 30+ |
| - Period 7/1/11 to 6/30/12 | | | | | |
| Average Monthly Benefit | 0.00 | 1,613.72 | 2,726.34 | 3,586.85 | 4,090.27 |
| Average Final Average Salary | 0.00 | 3,649.75 | 5,163.89 | 5,133.84 | 5,453.69 |
| Number of Retired Members | 0 | 2 | 72 | 23 | 6 |
| - Period 7/1/12 to 6/30/13 | | | | | |
| Average Monthly Benefit | 0.00 | 0.00 | 2,721.31 | 3,891.38 | 4,880.42 |
| Average Final Average Salary | 0.00 | 0.00 | 5,186.65 | 5,673.97 | 6,507.22 |
| Number of Retired Members | 0 | 0 | 79 | 16 | 11 |
| - Period 7/1/13 to 6/30/14 | | | | | |
| Average Monthly Benefit | 0.00 | 0.00 | 2,898.74 | 3,616.85 | 4,483.39 |
| Average Final Average Salary | 0.00 | 0.00 | 5,410.25 | 5,413.12 | 5,977.86 |
| Number of Retired Members | 0 | 0 | 70 | 15 | 4 |
| - Period 7/1/14 to 6/30/15 | | | | | |
| Average Monthly Benefit | 0.00 | 0.00 | 3,017.32 | 4,431.50 | 4,847.67 |
| Average Final Average Salary | 0.00 | 0.00 | 5,652.31 | 6,556.21 | 6,463.57 |
| Number of Retired Members | 0 | 0 | 86 | 34 | 11 |
| - Period 7/1/15 to 6/30/16 | | | | | |
| Average Monthly Benefit | 1,033.68 | 2,187.06 | 2,972.89 | 4,080.60 | 4,992.02 |
| Average Final Average Salary | 3,255.17 | 5,046.69 | 5,598.28 | 6,112.61 | 6,656.02 |
| Number of Retired Members | 5 | 4 | 72 | 21 | 20 |
| - Period 7/1/16 to 6/30/17 | | | | | |
| Average Monthly Benefit | 855.06 | 2,135.63 | 3,087.72 | 3,808.06 | 4,696.16 |
| Average Final Average Salary | 3,323.17 | 4,970.40 | 5,783.97 | 5,527.60 | 6,261.54 |
| Number of Retired Members | 2 | 8 | 78 | 21 | 14 |
| - Period 7/1/17 to 6/30/18 | | | | | |
| Average Monthly Benefit | 1,996.65 | 2,064.26 | 3,274.33 | 4,572.86 | 4,872.73 |
| Average Final Average Salary | 6,033.83 | 4,706.42 | 6,061.61 | 6,519.39 | 6,614.57 |
| Number of Retired Members | 5 | 3 | 73 | 10 | 16 |
| - Period 7/1/18 to 6/30/19 | | | | | |
| Average Monthly Benefit | 1,005.54 | 2,299.46 | 3,227.48 | 4,474.98 | 5,095.19 |
| Average Final Average Salary | 3,281.42 | 5,068.54 | 6,043.30 | 6,391.58 | 6,793.58 |
| Number of Retired Members | 1 | 6 | 75 | 21 | 24 |
| - Period 7/1/19 to 6/30/20 | | | | | |
| Average Monthly Benefit | 1,102.02 | 2,716.39 | 3,289.24 | 4,747.22 | 5,264.03 |
| Average Final Average Salary | 3,465.79 | 5,881.53 | 6,194.31 | 7,105.18 | 6,856.10 |
| Number of Retired Members | 3 | 4 | 65 | 38 | 27 |
| - Period 7/1/20 to 6/30/21 | | | | | |
| Average Monthly Benefit | 1,226.99 | 3,331.06 | 3,311.99 | 4,828.44 | 5,561.91 |
| Average Final Average Salary | 3,820.76 | 6,879.13 | 6,286.42 | 7,136.62 | 7,415.88 |
| Number of Retired Members | 17 | 2 | 114 | 60 | 28 |
| Five Year Average - Period 7/1/16 to 6/30/21 | | | | | |
| Average Monthly Benefit | 1,316.56 | 2,374.01 | 3,242.71 | 4,598.49 | 5,173.00 |
| Average Final Average Salary | 4,123.11 | 5,286.00 | 6,089.33 | 6,757.94 | 6,874.31 |
| Total Number of Retired Members | 28 | 23 | 405 | 150 | 109 |
| Ten Year Average - Period 7/1/11 to 6/30/21 | | | | | |
| Average Monthly Benefit | 1,273.70 | 2,295.79 | 3,062.53 | 4,344.21 | 5,050.82 |
| Average Final Average Salary | 3,991.61 | 5,140.15 | 5,759.71 | 6,390.06 | 6,718.84 |
| Total Number of Retired Members | 33 | 29 | 784 | 259 | 161 |

Note: This schedule includes service retirements as of July 1, 2021 and does not include disability retirements. For participants in the Deferred Option Plan, the Retirement Effective Date is the date the member left active service and the final average salary is determined as of the date the member effectively entered the Deferred Option Plan.



Oklahoma Police Pension and Retirement System

Accrued Benefit

The amount of an individual's benefit (whether or not vested) as of a specific date, determined in accordance with the terms of a pension plan and based on compensation and service to that date.

Actuarial Accrued Liability

That portion, as determined by a particular Actuarial Cost Method, of the Actuarial Present Value of pension plan benefits and expenses which is not provided for by future Normal Costs.

Actuarial Assumptions

Assumptions as to the occurrence of future events affecting pension costs, such as: mortality, withdrawal, disablement, and retirement; changes in compensation, rates of investment earnings, and asset appreciation or depreciation; procedures used to determine the Actuarial Value of Assets; and other relevant items.

Actuarial Cost Method

A procedure for determining the Actuarial Present Value of pension plan benefits and expenses and for developing an actuarially equivalent allocation of such value to time periods, usually in the form of a Normal Cost and an Actuarial Accrued Liability.

Actuarial Gain (Loss)

A measure of the difference between actual experience and that expected based upon a set of Actuarial Assumptions during the period between two (2) Actuarial Valuation dates, as determined in accordance with a particular Actuarial Cost Method.

Actuarial Present Value

The value of an amount or series of amounts payable or receivable at various times, determined as of a given date by the application of a particular set of Actuarial Assumptions.

Actuarial Valuation

The determination, as of a valuation date, of the Normal Cost, Actuarial Accrued Liability, Actuarial Value of Assets, and related Actuarial Present Values for a pension plan.

Actuarial Value of Assets

The value of cash, investments and other property belonging to a pension plan, as used by the actuary for the purpose of an Actuarial Valuation.

Actuarially Equivalent

Of equal Actuarial Present Value, determined as of a given date with each value based on the same set of Actuarial Assumptions.

Amortization Payment

That portion of the pension plan contribution which is designed to pay interest on and to amortize the Unfunded Actuarial Accrued Liability.



APPENDIX D – GLOSSARY OF TERMS

Deferred Vested Participant

A vested member who has terminated employment prior to early or normal retirement age who does not withdraw his or her contributions and is, therefore, due a retirement benefit at a later date.

Entry Age Actuarial Cost Method

A method under which the Actuarial Present Value of the Projected Benefits of each individual included in an Actuarial Valuation is allocated on a level basis over the earnings of the individual between entry age and assumed exit ages. The portion of this Actuarial Present Value allocated to a valuation year is called the Normal Cost. The portion of this Actuarial Present Value not provided for at a valuation date by the Actuarial Present Value of future Normal Costs is called the Actuarial Accrued Liability.

Market Value of Assets

The fair value of cash, investments and other property belonging to a pension plan that could be acquired by exchanging them on the open market.

Normal Cost

That portion of the Actuarial Present Value of pension plan benefits and expenses which is allocated to a valuation year by the Actuarial Cost Method Projected Benefits.

Projected Benefits

Those pension plan benefit amounts which are expected to be paid at various future times under a particular set of Actuarial Assumptions, taking into account such items as the effect of advancement in age and past and anticipated future compensation and service credits.

Unaccrued Benefit

The excess of an individual's Projected Benefits over the Accrued Benefits as of a specified date.

Unfunded Actuarial Accrued Liability

The excess of the Actuarial Accrued Liability over the Actuarial Value of Assets.

Withdrawal Liability

The liability due to an active member terminating employment with a deferred vested benefit.